SCO® UNIX® System V/386

Operating System

Installation Guide

The Santa Cruz Operation, Inc.

Contents

Chapter 1

Before You Start

Introduction

This guide explains how to install the UNIX Operating System on your computer. Read through this guide thoroughly before beginning the installation procedure so that you become familiar with the various steps and terminology used in each section. If you run into difficulties during the installation, please contact your provider for information on technical services.

You should read this chapter carefully before proceeding to the "Installation Procedure" in Chapter 2.

About Your Installation Media

The UNIX System is available on both cartridge tape and floppy disks. These distributions are described here.

The floppy disk distribution includes the following:

- two floppy diskettes labeled N1 (Root) and N2 (Filesystem), plus a few additional N volumes labeled N3, N4, and so forth

- one floppy diskette labeled M1 (Master Installation Floppy)

- Base Utilities, a set of diskettes numbered B1, B2, B3, and so forth

- Extended Utilities, a set of diskettes numbered X1, X2, X3, and so forth

The tape distribution includes the following:

- two floppy diskettes labeled N1 (Root) and N2 (Filesystem)

- one floppy disk labeled M1 (Master Installation Floppy)

- one 1/4-inch QIC cartridge tape

Although these distributions differ greatly in media, the instructions in this guide fit both versions. Where necessary, prompts specific to each installation are included to avoid confusion. In general, those using the tape installation can ignore references to any floppies other than the N1 and N2 volumes and the Master Installation disk.

Installation Requirements

This is what you need to install the UNIX System:

- a computer with an appropriate amount of memory. Check the *Release Notes* to find the amount of memory needed with your system, plus any additional requirements.

- the necessary disk space to install the software. Consult your *Release Notes* for the disk space requirements associated with the UNIX System. These requirements vary according to how much of the UNIX System you plan to install. The *Release Notes* have a chart of the disk space required.

- a large amount of disk space if you wish to install the complete distribution. Consult your *Release Notes* for this information. If you install a subset of the distribution, add the sizes of the segments you wish to install as instructed in the *Release Notes*.

- one floppy disk drive

- if you have a tape distribution, a 1/4-inch cartridge tape drive

- the UNIX System distribution media

- a serial number (an alphanumeric code printed on the serialization card)

- an activation key (an alphabetic code printed on the Serialization Card)

What You Need to Know

Before you begin the installation procedure, make sure your computer is fully assembled (and operational) and you are familiar with its operation. In particular you should know the following:

- how to turn the computer off and on

- how to insert floppy disks into the floppy drive

- how to reset the computer

If you have just assembled your computer for the first time or are unsure about the items listed above, briefly review the hardware manuals provided with your computer and hard disk. The hard disk must be connected to your computer according to manufacturer's specifications. Also, we suggest you run a system self-test as described in the *Operator's Guide* for your computer to detect possible hardware problems.

Note

> If you plan to also partition the hard disk for use with DOS or OS/2, you must install DOS first. Refer to "Creating and Formatting a Physical DOS Partition" in this chapter and "Using DOS and OS/2" in the *System Administrator's Guide* for details.

How to Use This Guide

This guide includes two chapters: this introductory chapter, which describes how to prepare for your installation, and the installation procedure itself. In addition, there are several appendixes that contain information on specialized configuration options that are applicable to only a few installations. Four exceptions are as follows:

- Appendix A, "Troubleshooting Your Installation," contains tips on solving some of the common problems that you may have during, and immediately after, installation.

- Appendix B, "Installing and Removing Additional Software," describes how to add or remove applications.

- Appendix C, "Creating an Emergency Boot Floppy Set," explains how to create a set of floppies that make it easier to recover your system in the event of a system failure.

- Appendix G, "Installation Glossary," contains terms used in the installation procedure. If you find a computer term you are not familiar with, look at this appendix.

Installation Options

There is a provision for a simplified installation: the "Automatic" disk initialization, which prepares your hard disk for loading the UNIX System distribution. The automatic initialization is for simple system configurations and should prove invaluable to those with little experience with computers and operating systems. Unless you have a specialized system configuration, you should choose the automatic disk initialization.

The "Fully Configurable" installation procedure is for systems with special requirements. In particular, if you wish to use any of the following features, you must use the configurable procedure:

- a "non-standard" hard disk; that is, a hard disk that is not supported by the ROM BIOS

- a special swap space allocation

In most cases, if you do not understand these features, you should choose the Automatic option. However, you should review the "Planning Your Disk Layout" section of this chapter and determine if these features are important for your needs. The Automatic option bypasses a dozen pages of hard disk configuration instructions, a real benefit if you are inexperienced or have simple needs.

Creating and Formatting a Physical DOS Partition

If you want a physical DOS partition on your UNIX System, you must create one before you install the UNIX System. To create a DOS partition once you have already installed the UNIX System, you must first back up your hard disk, create the DOS partition, and then reinstall your UNIX system and all applications.

Use the utilities and documentation packaged with your computer hardware to create and format a DOS partition.

The following restrictions apply when creating a DOS partition:

- UNIX supports MS-DOS versions 3.3 or earlier only.

- Always install the MS-DOS partition first. Because some versions of MS-DOS allow the DOS partition to start on the first cylinder only, the DOS partition should be the first partition on the first disk.

- Always format your new DOS partition with the following MS-DOS command:

      A> **format c:** **/s** **/v:"***label***"**

    This command formats the disk in the specified drive to accept MS-DOS files. The /s option copies the operating system files listed in the MS-DOS file *formats.tbl* from the diskette to the hard drive (c:). The /v:"*label*" option specifies the volume label to use. A volume label identifies the disk and can contain up to 11 characters.

Note

The MS-DOS **format** command is not the same as a low-level format.

- Always make sure the size of your UNIX partition is a multiple of the number of heads on the hard disk. (If you remapped the drive during a low-level format of the disk, use the mapped number of heads.) Otherwise UNIX **fdisk** warns that the UNIX partition is not on a cylinder boundary.

- Never begin the UNIX partition on the track immediately following the last track of the MS-DOS partition. Because MS-DOS does not expect another operating system after its ending track, sometimes it uses that space to store programs temporarily. If you install the UNIX partition directly after the DOS partition, you may lose the boot block.

- Your DOS partition should have a minimum size of 2.5 Mbytes; some DOS copy-protection schemes do not install on a partition smaller than 2.5 Mbytes.

- Never use more than 32 Mbytes for each MS-DOS partition.

- Never use the extended partition option in MS-DOS **fdisk**. Extended DOS partitions are not supported. UNIX allows you one MS-DOS partition per drive.

- Never use a third party disk partitioning product, such as Disk Manager, to partition the hard disk before installing MS-DOS and the UNIX System. Use MS-DOS **fdisk** to partition MS-DOS, and UNIX **fdisk** to partition the UNIX System.

Note

If you do not obey the preceding restrictions, you must start over with a low-level format of your hard disk and then reinstall the UNIX System.

Low Level Format Programs

Use a program such as **DOS-Debug** or **Speedstor** to perform a low-level format the disk. Many ESDI and SCSI disk controllers have on board BIOS routines. You can use these routines to perform a low-level format your disk.

Follow these steps:

1. Boot MS-DOS.

2. At the DOS prompt, enter:

   debug

3. Depending on your disk controller, enter one of the following commands at the "-" prompt:

   • For Adaptec SCSI controllers:

     g=dc00:6

   • For ESDI controllers:

     g=c800:5

Converting fdisk Numbers

DOS **fdisk** uses cylinders and UNIX **fdisk**(ADM) uses tracks. If you know the number of tracks per cylinder, you can use consistent numbers when using the two different versions of **fdisk**.

To obtain these numbers, you must know the total number of tracks and cylinders. UNIX **fdisk** lists the total number of tracks; the total number of cylinders should be listed in the documentation for your hard disk. Divide the total number of tracks by the total number of cylinders. If you need to convert track or cylinder information to megabytes, divide the total number of tracks or cylinders by the disk size.

Installing on Disks with Greater Than 1024 Cylinders

If your primary (root) hard disk has more than 1024 cylinders, the following restrictions apply:

- The disk controller must support disks with more than 1024 cylinders.

- If the disk is configured as the primary hard disk, the root filesystem **must** lie within the first 1024 cylinders. This is because the ROM BIOS cannot access boot information if it lies beyond the 1024th cylinder.

  If the boot information lies beyond the 1024-cylinder boundary, the system may hang mysteriously or display error messages. For more information, see Appendix A "Troubleshooting Your Installation" in this guide.

You can use the rest of the disk for swap space and additional filesystems. If you install a UNIX partition only, verify that the root filesystem is located within the first 1024 cylinders.

Because this limitation is expressed in cylinders and UNIX **fdisk**(ADM) uses tracks, you should determine the number of tracks per cylinder for your disk. To do this, follow the instructions in the section "Converting fdisk Numbers" earlier in this chapter. To determine the maximum allowable extent of the root filesystem in tracks, divide the total number of tracks by the total number of cylinders and multiply this number by 1024.

Note

If you remapped the disk during formatting, the root filesystem must lie within the first 1024 logical cylinders.

Responding to Prompts

1

Follow these rules when reponding to prompts for information:

- Enter all requested names and numbers exactly as shown.

- Complete a line by pressing the ⟨Return⟩ key. The ⟨Return⟩ key is sometimes denoted on the keyboard by a "down-left" arrow, or referred to as the ENTER key.

- Press ⟨Ctrl⟩u to delete everything on a line. (Press the ⟨Ctrl⟩ key and another key at the same time. This is the same type of action as using the ⟨Shift⟩ key.)

- Erase a character with the ⟨Bksp⟩ Key or by pressing ⟨Ctrl⟩h.

- (y/n)? is asking "yes or no?" and always requires a response from you. Enter **y** or **n** and press the ⟨Return⟩ key.

- Commands referred to in text are shown in **boldface** with the reference section next to the command in parentheses (for example, **cat**(C)). Refer to the preface of the *User's Reference* for a guide to the various reference sections.

Planning Your Disk Layout

If you anticipate a large number of users, heavy development usage, or you plan to use a database program, it is advisable to plan the layout of your hard disk. Systems under heavy use require decisions that affect performance.

This planning section discusses two segments of your hard disk (/u filesystems and the swap area) in relation to the UNIX root filesystem (the DOS partition is mentioned here because it affects available disk space):

- Swap space

  The swap space is a part of your disk that acts as an extension of your physical memory (RAM). Programs (or parts of programs) that are in active use but currently in a waiting state can be shifted to this area (swapped out) so that others can run in RAM. The swap space must be large if there are many users or large applications, such as databases.

- Separate (mountable) filesystems (/u)

  A large hard disk (140+ Mbytes) with many users can be slowed down by a large root filesystem. Creating a separate (usually called /u) filesystem for user accounts improves performance, makes backups easier, and helps protect the root filesystem from corruption during a system crash.

- DOS partition

  Those who wish to have DOS share the hard disk must consult the "Using DOS and OS/2" chapter of the *System Administrator's Guide* and load DOS on their disk first. The presence of a DOS partition makes it essential to plan your disk resources well, because it is necessary to reinstall the operating system to alter the layout of your hard disk. Read this section and plan your layout before installing DOS.

A series of simple worksheets is provided at the end of this section for calculating the size of your disk divisions. Although these calculations may look intimidating, they are entirely mechanical and only require the insertion of simple values.

Determining Swap Space Allocation

When the physical memory (RAM) is not large enough to contain all the running processes on the system, sleeping processes (tasks that are on hold while another process is being attended to) are moved to an area known as the "swap space." The swap space is a reserved portion of the hard disk, which should be as large as the amount of RAM you have installed. Swap space is allocated during operating system installation. The following are two methods for calculating the swap space size.

Letting divvy(ADM) Decide for You

If the system is used under typical multiuser operation (no large applications or development system), you can use the default swap space recommended during the installation procedure.

After **badtrk**(ADM) has run, you are prompted to choose the amount of space to allocate for the swap space. **divvy** calculates the minimum and maximum size based on the size of the hard disk. The following formulas are used (where blocks are 1024 bytes, that is, 1 Kbytes):

If the UNIX partition is greater than:	But less than:	The default swap allocation is:
40 Mbytes*	50 Mbytes	20% of partition
51 Mbytes	139 Mbytes	10 Mbytes
140 Mbytes	-	10 Mbytes + (partition size-140)/10†

    *   A UNIX partition size of less than 40 Mbytes is not recommended.
    †   A swap allocation of greater than 64 Mbytes is not recommended.

If you plan to install the Development System, enter a swap space size that is at least 1000 blocks larger than the default. This is especially important if you are planning to use large applications like databases and spreadsheets, or make programs memory resident for performance reasons.

Calculating the Swap Space Yourself

Systems using major applications (a large relational database, for example) should allocate the swap space according to the following formula. (Use the worksheet provided at the end of this section to perform your calculations.)

1.   Multiply the number of users on the machine by the size of the largest process (running program) that normally runs on the machine, in 1Kbytes.

2. Take the amount of memory installed in your machine and add 256K. Compare this result with the result from step 1. Use whichever number is larger as your swap space size.

3. Adjust the number upward if multiple users are running different applications that are large. Try adding 1 Mbyte per different large application. (Consider the Development System to be a large application.)

For example, the calculations for an eight-user machine with 4 Mbytes of memory with a typical mix of spreadsheet, database, word processor, and graphics package looks like this:

1. 8 users x 1 Mbyte = 8 Mbytes.

2. 4 Mbytes memory installed + 1 Mbyte = 5 Mbytes, which is smaller than the number calculated in step 1.

3. There are 4 users using different large applications. 4 x 1 Mbyte = 4 Mbytes. Add this to the greater amount from steps 1 and 2 to obtain a reasonable calculation of swap space: 8 Mbytes + 4 Mbytes = 12 Mbytes. Because the operating system uses a block size of 1 Kbyte, this means that a swap space allocation of 12 Mbytes translates simply to 12000 blocks.

Deciding Whether to Have a Separate (/u) Filesystem

If you are installing on a hard disk (or partition) that is larger than 240 Mbytes, you are asked to decide whether to divide the UNIX partition into two separate filesystems. Use separate filesystems if the size of your root filesystem and swap space subtracted from the size of your UNIX partition is greater than 20 Mbytes.

You can create additional filesystems even if your partition is smaller than 240 Mbytes; this is simply the automatic formula. This other filesystem is typically called /u; however, it can be named anything you like except *root* or *swap*. The /u filesystem is typically used for user accounts and files. There are certain advantages and disadvantages to using a /u filesystem.

There is no need to create a /u filesystem if your setup is a runtime system (none or very few operating system packages installed) with a single dedicated application or with little user file storage.

Advantages of a /u Filesystem

There are several advantages to separate filesystems:

- System backups are easier.

  In a typical system, user files can change often while UNIX utilities and system files usually remain unchanged once they are installed. Most users create and modify files in their home accounts frequently, so user accounts should be backed up often, while the root filesystem should only require an occasional backup. With separate filesystems, less media (for example, fewer floppy disks, fewer tapes, smaller tape size, and so on) are required to make backups of individual filesystems.

- Smaller filesystems are faster.

  File access is faster because the operating system has fewer inodes (file identifiers) and data blocks (filesystem subdivisions) to search. Each filesystem has its own inode and data block areas. Another reason is when a system is shut down improperly ("crashes"), all filesystems are checked and cleaned using **fsck**(ADM). It takes less time to clean two smaller filesystems than one large filesystem.

- During a system crash, a less active filesystem usually sustains less damage than an active filesystem.

  By decreasing activity in the root filesystem, there is less chance of damage to the root filesystem. The /u filesystem can be recreated easily by remaking it and restoring it from backups.

Disadvantages of a /u Filesystem

There are two disadvantages, both relating to administration rather than performance:

- Once a division is made, it is impossible or very time consuming to change the size of or delete a filesystem. To do this the entire UNIX partition must be backed up, and the filesystem sizes changed using the **divvy**(ADM) utility; then the entire system must be restored from backups. This should only be done by an experienced system administrator. It is often easier to simply reinstall from scratch.

- There is a degree of additional operating system complexity intro-
  duced by an extra filesystem. This can make system administration
  more complicated for novices. This can include such mundane
  concerns as remembering to mount other filesystems if they are not
  mounted automatically at boot time.

Determining Space for a /u Filesystem

To determine if there is sufficient room on your hard disk for a /u filesys-
tem, perform the calculations described in the following steps. (This for-
mula is lengthy; review it here and then use the worksheet at the end of
this section.)

1. Add together the sizes of all the operating system packages that
    you intend to install on your system. Package sizes (in 512 byte
    blocks) are found in the *Release Notes* under "Operating System
    Packages."

2. Calculate the size for the */tmp* directory. */tmp* is used by many
    UNIX programs as a temporary storage area. Allow at least half a
    megabyte per user. Add another half a megabyte per user to this
    number if some users will be using large databases, editing large
    files, or working on software development.

3. Be sure to include the disk size requirements for any applications
    on the root filesystem. Most applications usually list disk space
    requirements in their *Release Notes*.

4. Add the results of steps 1, 2, and 3. This represents the size of a
    completely full root filesystem.

5. In addition, 10-20% of the size of the root filesystem must be kept
    as free space after all the software is installed. Take 20% of the
    root filesystem size obtained in the previous step and add it to that
    number. As an example, let's assume the root filesystem is 40
    Mbytes in size. To keep approximately 20% of it free, we would
    add 8 Mbytes to the root filesystem size, for a total of 48 Mbytes.
    When a filesystem becomes filled beyond this point, an inordinate
    amount of time is spent by the operating system finding free space
    when needed, causing performance to suffer.

6. Subtract the requirements for the root filesystem (as calculated in
    step 5) from the size of your UNIX partition (or size of your hard
    disk if the UNIX system is the sole occupant). You should have
    more than 10 Mbytes left on your hard disk before considering
    adding a /u filesystem.

7. Calculate the requirements for the /u filesystem. Allow at least 1.5 Mbytes of disk space per user on the /u filesystem. Add in the requirements for any databases in the /u filesystem. Database requirements depend upon the maximum size the files will reach, how many users will be using the database, and what files if any will be shared among the users of a database. Also, add the size of any applications that will reside in the /u filesystem. If the space needed for the /u filesystem is less than the number calculated in step 5, then you can safely add a /u filesystem.

8. Multiply the size in megabytes of the /u filesystem by 1000 to get the number of 1K blocks to allocate to the /u filesystem.

Disk Layout Worksheets

Use the following worksheets to perform the calculations discussed in the preceding sections.

Swap Space Allocation			
1. Number of users:	_____	x 1Mbyte	= _____
2. Amount of RAM installed:	_____	+ 1Mbyte	= _____
3. Greater of (1) and (2):			= _____
4. Number of large Applications:	_____	x 1Mbyte	= _____
5. Sum of (3) and (4):			= _____

Sizes of Disk Divisions	
DOS partition:	_____
UNIX partition:	_____
Swap space:	_____
/u filesystem:	_____

/u Filesystem Allocation		
Instructions	**Calculation**	**Result**
1. Sum of OS packages to be installed (converting 512 byte blocks to megabytes)	_____ / 2000	= _____
2. Number of users times ½ Mbyte per user	_____ x .5 Mbyte	= _____
3. Number of users using database or DS times ½ Mbyte per user	_____ x .5 Mbyte	= _____
4. Add (2) and (3) for size of /tmp	....	= _____
5. Disk requirements for applications	....	= _____
6. Size of root filesystem: add (1), (4), & (5) plus 20%	_____ x 1.2	= _____
7. Subtract size of root filesystem (6) from UNIX partition (or whole disk)	_____ - _____	= _____
8. If (7) is less than 5-10 Mbyte, you cannot have a /u filesystem	....	....
9. Number of users times 1½ Mbyte per user	_____ x 1.5 Mbyte	= _____
10. Size of applications to reside in /u	....	= _____
11. Size of any database files to reside in /u	....	= _____
12. Add (9) through (11) for size of /u filesystem	....	= _____
13. If /u (12) is less than (7), continue, else no /u	....	....
14. Convert /u (12) size to blocks	_____ x 1000	= _____

Chapter 2

Installation Procedure

Introduction

This chapter describes how to install the UNIX System. If you have not read Chapter 1, "Before You Start," please do so now. Chapter 1 contains important information you should be aware of before installing your system.

Read through this chapter thoroughly before beginning the installation procedure so that you become familiar with the various steps and terminology used in each section. If you run into difficulties during the installation, support is available from a wide range of sources. Please contact your provider for more information on technical services.

The installation process consists of several stages:

- starting the system from the N1 and N2 floppy disks

- preparing the hard disk for installation

- starting the operating system from the newly initialized hard disk

- installing the parts of the UNIX distribution you need and loading your application programs

- configuring your system with the menu-driven **sysadmsh** system administration shell, including adding user accounts and choosing what kind of security you wish to have

- preparing the system for general use, including setting the system (*root*) password and restarting the system to make your configuration changes take effect

Installation Instructions

This section guides you though the UNIX System installation process. When necessary, you are directed to follow additional steps contained in the appendixes at the back of this guide.

Note

> If you wish to partition the disk to accommodate another operating system, stop immediately. If you intend to install an MS-DOS partition, you must create it before installing the UNIX System. If you do not, you may render your UNIX partition unusable. Consult your MS-DOS installation documentation to create your DOS partition. See "Creating and Formatting a Physical DOS Partition" in Chapter 1 of this guide for important information. "Using DOS and OS/2" in the *System Administrator's Guide* explains how the UNIX partition and the MS-DOS partition share the hard disk.

Follow these steps, remembering to press ⟨Return⟩ after you enter your responses on the keyboard.

1. Find the distribution disks labeled N1 (or "BOOT" disk) and N2 (or "FILESYSTEM" disk).

2. Insert the N1 (BOOT) floppy disk into the drive. If you have more than one floppy drive, use the primary drive (sometimes called the boot drive). Check your computer hardware manual if you are not sure which drive is the primary drive.

3. Turn on your computer. The computer loads the UNIX bootstrap program from the floppy disk and executes it. In the upper left corner of the screen, the computer may display the total amount of memory installed. Next, you see:

```
SCO System V/386

Boot
:
```

Press ⟨Return⟩ to boot from the floppy drive.

Note

Should you need to restart the installation over from the beginning, enter **restart** when the boot prompt is displayed. The system then starts from the very beginning.

4. Next you see:

```
fd(64) unix root=fd(64) swap=ram(0) pipe=ram(1) swaplo=0 nswap=16 ronly
```

5. After a moment, a series of prompts are displayed with trailing dots:

```
loading .text
......................................................
......................................................
......................................................
......................................................
loading .data
..............................................
loading .bss
```

These are progress messages that proceed as software is loaded.

6. You are then prompted to insert the next floppy diskette:

```
Insert N2 (Filesystem) floppy and press <Return>
```

Remove the N1 (BOOT) floppy disk, insert the N2 (FILESYSTEM) floppy disk and press ⟨Return⟩.

7. After the operating system kernel is loaded in memory, the system displays a copyright statement followed by system configuration information. This information appears similar to the following:

```
device     address          vector dma comment
------------------------------------------------------------------------
%serial    0x03F8-0x03FF    04     -   unit=0 type=Standard nports=1
%serial    0x02F8-0x02FF    03     -   unit=1 type=Standard nports=1
%floppy    0x03F2-0x03F7    06     2   unit=0 type=96ds15
%console   -                -      -   unit=ega type=0 12 screens=68k
%parallel  0x0378-0x037A    07     -   unit=0
%disk      0x01F0-0x01F7    16     -   type=W0 unit=0 cyls=286 hds=16 secs=63
mem: total = 3712k, kernel = 1436k, user = 2276k
rootdev = 1/40, swapdev = 1/41, pipedev = 1/40
nswap = 30000, swplo = 0, Hz = 60
kernel: i/o bufs = 468k
```

The system performs a self-check to determine if there are any problems detected with the hardware. Each stage generates a letter from A-Z, most of which are displayed and overwritten too rapidly to be seen.

8. If the letters stop displaying before the letter "Z" is reached and no boot prompt appears, run hardware diagnostics as explained in your computer manual, correct any identified problems, and start the installation procedure again from the beginning. If the letters stop again, please contact your provider for more information and be prepared to report the last letter displayed.

The self-check using letters A-Z occurs every time you bring up your UNIX System.

9.   Next, the following menu is displayed:

```
Setting installation display environment...

Keyboard Selection
         1. American
         2. British
         3. French
         4. German
         5. Italian
         6. Spanish

Use the Numeric Keypad if present, using <Num Lock> if
necessary, to select one of the above options:
```

Select the number that corresponds to your keyboard.

10.   The next prompt is for the hard disk initialization:

```
              System V Hard Disk Initialization
The primary hard disk in the system will now be initialized.
This will create a UNIX partition on the disk and divide it
into filesystem(s) and a swap space.

You can choose a fully configurable disk initialization,
which requires you to set the disk parameters, specify the
size of the UNIX partition, and control the layout of
filesystems and swap area.  You will be presented with
defaults at each selection.

You can also choose an automatic disk initialization
that creates a complete disk layout and configuration using
system default values.

Choose one of the following:
         1. Fully Configurable Initialization
         2. Automatic Initialization (use system defaults)
         3. Exit Installation
Enter your choice:
```

If you decide to use the Automatic option, enter **2** and press
⟨Return⟩. This option initializes the hard disk without prompting
for disk parameters, filesystem sizes, and so forth. If you choose
the Fully Configurable option, proceed to Appendix D, "Running
the Configurable Disk Initialization," and follow that procedure.

11. The following confirmation message is displayed:

```
Verify Automatic Disk Initialization

You have chosen to initialize the primary hard disk
automatically using system defaults.

This option requires that your system was set up to recognize
the hard disk at the factory, or that you have run the proper
setup floppy disk prior to System V Operating System installation.

The hard disk initialization will preserve any pre-existing
DOS partition, but will overwrite any non-DOS partitions.
A single, active UNIX partition will be created and divided
into a root filesystem, a swap area, and if the UNIX partition
is 245 megabytes or larger, a user (/u) filesystem.

Setting up the hard disk may take as long as one minute per
megabyte of space on the disk.

Are you sure you wish to do this (y or n):
```

Respond **y** and press ⟨Return⟩.

12. First, you see a line describing the hard disk you have installed. It is similar to this example:

```
%disk  0x01F0-0x01F7  16  -  type=W0 unit=0 cyl=286 hds=16 secs=63
```

For SCSI disks, two lines are displayed.

13. Next, you see:

```
Creating UNIX partition...
```

Note

If you have a SCSI or SMS-OMTI ESDI controller, your disk is not scanned for bad tracks and you should skip the next step. All other ESDI disks or controllers are scanned.

14. If you are installing on an ST506 or ESDI disk, the disk is scanned for flaws and those flaws are recorded in the bad track table. You see the following:

    ```
    Scanning disk...
    Destructively scanning track x/y , n % of scan completed
    ```

    This process takes a great deal of time: approximately one minute per megabyte of disk space.

    2

15. The following prompts are displayed:

    ```
    Dividing UNIX partition into filesystem and swap divisions...

    Making filesystems

    Setting up hard disk root filesystem...
    ```

    A few minutes elapse between these messages.

16. When the process is complete, you see:

    ```
    Initialization of the hard disk is now complete.
    ```

Note

If you want to add additional hard disks, finish the installation procedure first. You are referred to the proper instructions later in this procedure.

---

17. If you have the cartridge tape distribution, you see the following
     messages:

```
Configuring for Tape Install

Valid tape types are
      SCSI
      wangtek
      everex
      archive
      mountain
      emerald
      tecmar
Enter the type of tape in use:
```

Enter the name of your tape drive and press ⟨Return⟩. (You need
not use uppercase for SCSI.)

If you selected SCSI, you see the following:

```
You must have your SCSI tape drive configured as:
      -ID number 2
      -SCSI host adapter 0
      -Logical unit number 0
```

If you did not configure your drive as instructed, you should wait
until the reboot message occurs, switch your machine off, set the
correct jumper settings, turn the machine on again and continue the
installation.

If you selected any drive other than SCSI, you see a display similar
to the following, which corresponds to the Wangtek:

```
Here are the default values for this tape type:
Tape Type: wangtek
Base Address: 0x338
Interrupt Level: 5
DMA Channel: 1
Do you wish to use these values? [ynq]
```

These are the manufacturer defaults. If they are correct for your
configuration, enter **y**, press ⟨Return⟩, and continue to the next step.
If you need to modify any of the parameters, enter **n**, press ⟨Return⟩,
and you are prompted for each in turn. When the parameters are
entered, your input is displayed as above. Press **y** and ⟨Return⟩
when the parameters are correct.

18. The system now shuts down and displays instructions on booting the newly initialized hard disk:

```
AFTER you see the message  **    Safe to Power Off   **
                           -or-
                    ** Press Any Key to Reboot **

remove the N2 (Filesystem) floppy from the floppy drive and
insert the N1 (Boot) floppy.  (The floppy light may stay on.)
Close the floppy door, then press any key.

The screen will clear and you will see the boot message:

    Boot
    :

Press <Return> to reboot the system and continue the installation.
```

2

19. Remove the N2 floppy as instructed and replace it with N1. Press ⟨Return⟩ to reboot the system. You see the following boot prompt:

```
SCO System V/386

Boot
:
```

20. Make certain the N1 (BOOT) floppy disk is in the drive and press ⟨Return⟩. You see the following:

```
fd(64)unix root=hd(40) swap=hd(41) pipe=hd(40)
```

If you have the tape distribution, the appropriate bootstring (for example, "ct=archive(0x220,3,3)" for an archive drive) is also included on the boot line. This is followed by the messages with trailing dots that were displayed at the beginning of the installation.

21. After a moment, copyright messages are displayed, followed by information about the configuration of your system.

As before, the system performs a self-check to determine where any problems exist with the hardware. The letters A-Z are displayed, each overlapping the previous letter. If the letters displaying stop before the letter "Z" is reached, run hardware diagnostics as explained in your computer manual. Correct any identified problems and start the installation procedure again from the beginning.

If the letters stop at this point, call your provider for technical support information and be prepared to say at what letter the display ended.

22. Next, the display environment message is printed again:

```
Setting installation display environment...
```

23. Now you are prompted to make sure the N1 (BOOT) floppy disk is in the drive. You see the following:

```
Verify that the N1 (Boot) floppy is in the drive and the
floppy door is closed and press <Return>
```

24. Next you are prompted to insert the M1 (Master Installation) floppy:

```
Insert Master Installation Floppy
and press <Return> or enter q to quit:
```

Note

If there is an error with the extraction procedure, you see the message:

```
Extraction error, try again? (y/n)
```

Make sure you are using the correct floppy disk, and that the door of the floppy drive is completely closed; then enter **y** and press 〈Return〉. If the message persists, see "Error reading a floppy" in Appendix A, "Troubleshooting Your Installation," in this guide.

25. If you have the cartridge tape distribution, you are then asked to insert the cartridge tape:

```
Insert SCO System V Operating System Tape Volume 1
and press <Return> or enter q to quit:
```

Insert the tape as instructed and press ⟨Return⟩. The Run Time system is then installed. Proceed to step 28.

Note

If you did not configure your SCSI drive properly, the system will not be able to access the tape. You can enter **q** and press ⟨Return⟩ and the system will shut down. You can then reconfigure the device, restart the system and you will be prompted for the tape once again.

26. If you have the floppy disk distribution, you are prompted to insert volumes B1-B4. The prompts appear like this:

```
Insert SCO System V Runtime System Floppy Volume B1
and press <Return> or enter q to quit:
```

Insert each B volume as instructed.

27. You are then prompted to insert some N volumes. If you insert a floppy disk in the wrong order, you see this prompt:

```
Error:  Incorrect volume in drive
```

Remove the floppy disk from the drive, insert the correct volume, and press ⟨Return⟩.

28. Next, you see the RESTRICTED RIGHTS LEGEND followed by the prompt for product serialization:

```
SCO System V Operating System Serialization

When prompted, use the serial number and activation key included
with the SCO System V Operating System distribution

Enter your serial number or enter q to quit:
```

Enter the serial number exactly as it appears on your serialization card and press ⟨Return⟩. Then you see the message:

```
Enter your activation key or enter q to quit:
```

Enter the activation key exactly as it appears on your serialization card and press ⟨Return⟩.

If you make a mistake, you see:

```
Error: Invalid activation key

Do you wish to try activation again? (y/n)
```

Enter **y** and press ⟨Return⟩. Try your code again. If it still fails, contact your provider. If you enter **n**, the installation is aborted.

29. Next, you are prompted to set the time zone appropriate to your location. This procedure is simple if you are in North America. Those in other areas should read Appendix E, "Setting Time Zones Outside North America," and set their time zone as described there. The first thing you see is:

```
Time zone initialization

Are you in North America? (y/n)
```

If you are not in North America, enter **n** and proceed to Appendix E to set your time zone. If you are in North America, enter **y**. You see the following menu:

```
1. NST  - Newfoundland Standard Time
2. AST  - Atlantic Standard Time
3. EST  - Eastern Standard Time
4. CST  - Central Standard Time
5. MST  - Mountain Standard Time
6. PST  - Pacific Standard Time
7. YST  - Yukon Standard Time
8. HST  - Hawaiian/Alaskan Standard Time
9. NST  - Nome Standard Time

Enter the number that represents your time zone or enter q to quit:
```

If, for example, your time zone is Nome Standard time, you would enter the number **9** and press ⟨Return⟩.

30. You see the following:

```
Does daylight savings time (summer time) apply at your location?  (y/n)
```

If daylight savings or standard time changes occur in your area, enter **y**. If not, enter **n**. The time zone variable, located in *letc/TZ*, is changed accordingly. Your time zone is now set.

31. Next, the **terminfo**(M) database is compiled, which takes only a few moments:

```
Setting up terminfo database.  This will take a moment...
```

32. When this is complete, the following message is displayed:

```
Checking file permissions ...
```

33. You are prompted for the type of security you wish to have:

```
Trusted System Configuration

As distributed, the system is designed to meet the requirements
for the C2 class of trust, which describes the level of
protection given to prevent unauthorized access to a system and
its data.

If you do not wish to follow the C2 guidelines, you can choose
here to configure the system to behave in a manner consistent
with standard System V security.  The Relaxed defaults include
less stringent password aging, fewer login restrictions, and
fewer limits on the kind of programs that users can run.  Note
that a system that has been relaxed cannot be reliably
restored to the C2 level.  Refer to "Maintaining System Security"
in your System Administrator's Guide for more information.

Choose one of the following:

        1) Trusted C2 Defaults
        2) Relaxed Defaults

Enter your choice or q to quit:
```

Unless you have special security requirements and understand the restrictions imposed by C2, we recommend you select the Relaxed defaults by entering **2** and pressing ⟨Return⟩.

34. If no display adapter is installed in your computer (the system assumes you are using a terminal as a serial console), you see the following prompt:

```
Please enter your terminal type as listed on the terminals(M)
manual page in your User's Reference.  For example, if you are
using a VT100 terminal, the proper terminal type is vt100.

Enter terminal type:
```

If you do not know the terminal type, refer to the manual page as directed. Hundreds of terminal types are supported, and many terminals have "emulation" modes that imitate popular terminals. Consult the user's manual for your terminal for setup instructions.

35. Next, the following messages are displayed, followed by a "Current Disk Usage" summary:

```
You have now installed the SCO System V minimum Run Time System.
The Run Time System will support most application programs,
so you may choose to stop installation now and preserve
the maximum available disk space for user files.

The remainder of the SCO System V product (including
Operating and Development System sets) are
installable in small packages. You may either
install each set entirely or selectively choose
which packages of the set to install.
```

36. You also see a menu that gives you the option of stopping or continuing with the installation:

```
1. Install additional software (Extended Utilities or applications)
2. Continue installation
```

So far you have installed the minimal, or "Run Time" system. If you are installing the operating system merely as a platform for an application, you may not need to install more software. However, should you need to administer the system extensively, have user accounts, and use the system administration shell, you need to install more software before completing the installation. If you want to install operating system packages or applications, select option **1** and press ⟨Return⟩.

37. This stage involves "customizing" your system, adding only those parts of the operating system distribution that are useful to you. You can also install your applications as well. The installation program **custom**(ADM) is automatically invoked to install UNIX packages and other products, including applications.

38.   The main **custom** menu is displayed:
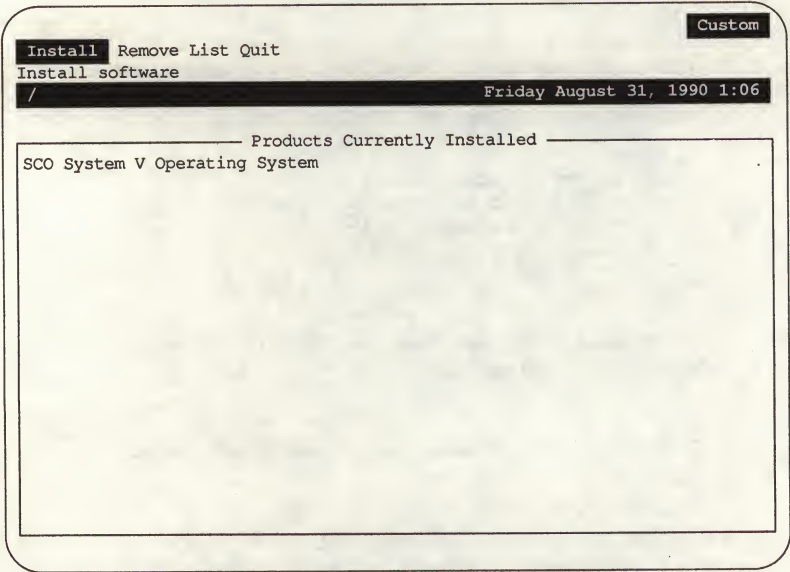
```
                                                              ┌─────────┐
                                                              │ Custom  │
 ┌──────────┐                                                 └─────────┘
 │ Install  │ Remove List Quit
 └──────────┘
 Install software
 ┌──────────────────────────────────────────────────────────────────────┐
 │ /                                        Friday August 31, 1990 1:06   │
 └──────────────────────────────────────────────────────────────────────┘

 ──────────────────────── Products Currently Installed ─────────────────────
 SCO System V Operating System                                            .
```

The menu is already set to select Install, for installing software;
press ⟨Return⟩ to continue.

39.   You see the next screen:

```
                                                              Install
Select a product to install and press <Return>
Press <ESC> to cancel, movement keys are active
 /                                          Friday August 31, 1990 1:06

                            ─── Install ───


        Select a product    :    [                          ]

        Choose an option    :    [ Entire Product ]    Packages    Files




                              A New Product
                             *SCO System V Operating System
```
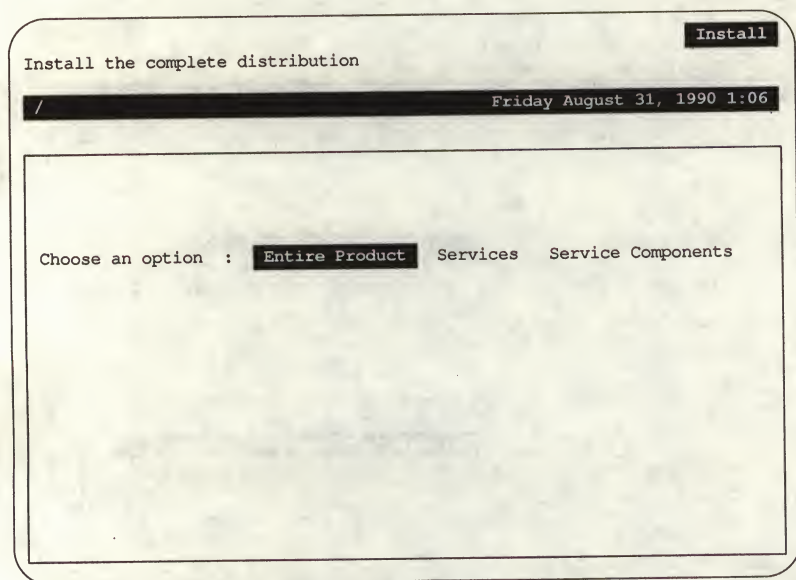
Use the ⟨Down Arrow⟩ key to highlight the SCO System V Operating System as shown and press ⟨Return⟩.

40. After a moment you see the following:

```
                                                    Install
Install the complete distribution
                                        Friday August 31, 1990 1:06
/


    Choose an option  :  Entire Product   Services   Service Components
```

If you wish to install the entire distribution, press ⟨Return⟩ and you are asked to insert the necessary volumes, starting with X1 in the case of the floppy distribution. For the tape distribution, you are asked to insert the tape Volume 1. You should then proceed to step 45. If you want to install only portions of the operating system, use the ⟨Left Arrow⟩ key to highlight Service Components and press ⟨Return⟩.

41.   You see the next screen:

```
                                                          ┌─────────┐
                                                          │ Install │
 Select service component(s) to install and press <Return>└─────────┘
 Press <ESC> to cancel, movement keys are active
 ╱                                        Friday August 31, 1990 1:06


    ┌──────────────────────────────────────────────────────────────┐
    │                                                                │
    │                                                                │
    │    Choose an option  :  Entire Product  Services  [ Service Components ]
    │                                                                │
    │                                                                │
    │                                                                │
    │                                                                │
    │                                                                │
    │                    ──── SCO System V Operating System ────     │
    │ SCO System V Runtime System                                    │
    │ SCO System V Extended Utilities                                │
    │                                                                │
    └──────────────────────────────────────────────────────────────┘
```

Use the ⟨Down Arrow⟩ key to select SCO System V Extended Utilities and press ⟨Return⟩.

42.   You see this screen:

```
                                                              ┌─────────┐
                                                              │ Install │
                                                              └─────────┘
Install the entire product
Press <ESC> to cancel, movement keys are active
/                                          Friday August 31, 1990 1:06

┌──────────────────────────Install──────────────────────────┐
│                                                            │
│                                                            │
│      Select a product   :    SCO System V Extended Utilities │
│                                                            │
│      Choose an option   :   ┌───────────────┐               │
│                             │ Entire Product │  Packages  Files │
│                             └───────────────┘               │
│                                                            │
│                                                            │
│                                                            │
│                                                            │
│                                                            │
└────────────────────────────────────────────────────────────┘
```

The Entire Product option is highlighted. Use the ⟨Right Arrow⟩ key to highlight Packages and press ⟨Return⟩.

43. After a moment you see the following:

```
                                                              Install
Insert the requested volume
Press <ESC> to cancel, movement keys are active
/                                         Friday August 31, 1990 1:06



      Insert:    SCO System V Extended Utilities
                 Floppy Volume X1

   Continue      Quit
```
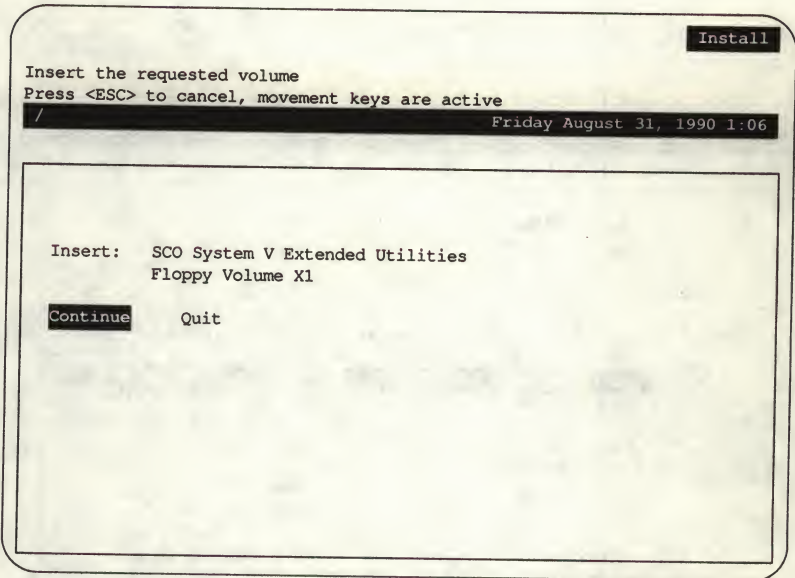
The tape distribution prompts for Tape Volume 1. Insert the volume as instructed.

44. Next, data files are loaded and you see the list of operating system packages similar to the following:

```
                                                          ┌─────────┐
                                                          │ Install │
                                                          └─────────┘
 Select package(s) from which to choose files and press <Return>
 Press <ESC> to cancel, movement keys are active
 /                                         Friday August 31, 1990 1:06


   Insert:   SCO System V Extended Utilities
             Floppy Volume X1

   [Continue]     Quit

                    ─── SCO System V Extended Utilities ───
             Name      Inst    Size      Description
            *ALL       Part    18688     Entire Extended Utilities
             BACKUP    No      254       System backup & recovery tools
             BASE      Part    1406      Basic extended utility set
             CSH       No      126       The C-Shell
             DOS       No      368       DOS utilities
             KSH       No      208       The K-Shell
             EX        No      406       The ex and vi editors
             FILE      Part    480       File manipulation tools
             LAYERS    No      194       System V Layers
```

You can move up and down the list using the arrow keys. If you wish to select several packages to install, use the ⟨Space⟩ bar to mark each one with an asterisk (*). When you press ⟨Return⟩, each item you have marked is installed. Note that you can add all available packages by selecting ALL.

Refer to "Packages in This Set" in your *Release Notes* for a list of operating system packages. The only software presently installed on your system is the RTS package, or Run-Time System. This represents the minimal software needed to have a functioning operating system. Other packages can be added that suit your needs; if your system is merely a platform for applications such as spreadsheets, word processors, or databases, you should install the following packages:

SYSADM	a user-friendly interface for system administration
BACKUP	utilities to perform backups
LPR	the line printer spooler
MAIL	mail program for sending messages to other users

In addition, packages such as BASE, EX, and CSH are useful for those who wish to work in a traditional UNIX environment, using the **ex**(C) or **vi**(C) file editors, various file utilities, and the C-shell (**csh**(C)).

Note

We recommend that you install the EX, FILE, BASE and LINK packages, as these contain useful utilities for maintaining your system. The EX package is recommended because it contains the **vi** editor, and the documentation uses this as an example editor when you are asked to edit default files. Some products (such as network software) have drivers that require linking into the kernel, so you should install the Link Kit (LINK).

If you have a large hard disk and space is not a problem, you can select ALL and install every package of the operating system.

45. If you install the MAIL or ALL package (or you selected Entire Product), you are eventually prompted for the following:

```
Executing SCO System V Operating System Init Script

Your system name is set to scosysv.  Do you wish
    the mail system to use a different name? (y/n)
```

If you respond **y**, you are prompted to enter the new name.

The system confirms your choice with the following message:

```
The mail system will use the name name.UUCP as the local machine name.
If you want to change this, please edit the file /usr/mmdf/mmdftailor,
and any files in the directory /usr/mmdf/table that contain the old name,
and then run /usr/mmdf/table/dbmbuild.
```

You should consult "Setting Up Electronic Mail" in the *System Administrator's Guide* for more information about the system name and mail routing.

46. You can install your applications using the option A New Product from the **custom** Install menu. You are prompted for various volumes (including parts of your operating system distribution) just as you were for UNIX packages.

47. When you are finished installing UNIX packages and any products, exit **custom** by selecting Quit and entering **y** when you are asked to confirm your choice. The following menu is then displayed:

```
The system software is now installed and the system configured for
a single user (root).

At this point, you may use the System Administration Shell
to add users, configure the system, or change system defaults.

        1. Run System Administration Shell
        2. Continue installation
```

Select **1** and press ⟨Return⟩.

48. A warning message is displayed:

```
NOTE: Be sure to use the Quit option to exit the
System Administration Shell, so that the remainder
of the installation will be completed.

Press <Return> to continue
```

Press ⟨Return⟩.

49.   The main **sysadmsh** menu is displayed:

```
                                                    SysAdmSh
System Backups Accounts Printers Media Jobs Dirs/Files Filesystems Quit
Administer and configure system resources and report system status
   /                                    Friday August 31, 1990 1:06
```
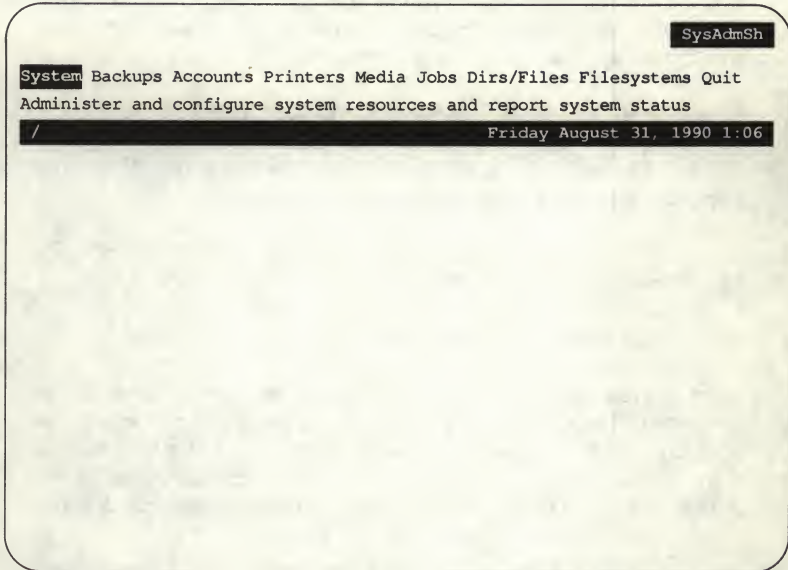
The "sysadmsh: Using the System Administration Shell" chapter
of the *System Administrator's Guide* explains how to use this inter-
face in detail. For now, use the following chart of keystrokes to
guide you in making selections:

Basic Menu Keystrokes

Keystroke	Action
Arrow keys, or ⟨Space⟩ (same as ⟨Right Arrow⟩ key)	Moves to menu option.
First letter of option, or move highlight to option and press ⟨Return⟩	Selects menu option.
⟨Esc⟩	Retreats to previous menu.
⟨F1⟩	Gets help.

You can familiarize yourself with the menu options by using the arrow keys or ⟨Space⟩ to move the highlight from option to option. Each time you move the highlight to a new option, a description of that option appears on the description line.

50. If you created additional filesystems on your hard disk (such as /u) earlier in the installation, follow the instructions in Appendix F, "If You Created Additional Filesystems," before proceeding. This appendix prepares the additional filesystem(s) for use.

51. You should now add user accounts to the system, if desired. The **sysadmsh** selection to do this is:

    Accounts→User→Create

    Each person using the system should have a login account and password. The security of your system is greatly dependent on the restrictions you impose on the use of accounts. For more information, see the "Administering User Accounts" chapter of the *System Administrator's Guide*. You can also alter the defaults used to create accounts and administer them.

52. When you are finished, exit **sysadmsh** by selecting Quit at the top-level menu.

53. You are first prompted to provide the *root* password:

```
Please assign a password for the super-user account, "root".
Setting password for user: root
Last successful password change for root: NEVER
Last unsuccessful password change for root: NEVER

            Choose password

You can choose whether you pick your own password,
or have the system create one for you.

        1. Pick your own password
        2. Pronounceable password will be generated for you

Enter choice (default is 1):
```

Enter **1** to pick your own password.

54. Next, you are prompted to enter the password, twice:

```
Please enter new password (at least 5 characters):
Please choose a password which contains a mixture of lower-
and upper-case letters, digits (0 - 9), and non-alphanumeric
characters (e.g., !, #, @, ;, %, or /.)

Please do NOT choose a password that is an English word,
or which is the name of a person, place, or thing, or which
contains the string "SCO", "XENIX", or "UNIX" (in either case).

Re-enter password:
```

2

The new password can be any combination of letters, numbers, and punctuation marks, but should be at least five characters long. Enter the new password and press ⟨Return⟩. The system does not display the password as you enter it, so type carefully.

The super-user password is now in place. From now on, the password is required whenever you attempt to access the system as super user. The super-user password keeps the system safe from unauthorized use. It is very easy to make errors that could destroy files when logged in as the super user. Log in as super user only to install programs and to do system maintenance tasks. For a complete description of the super user, see the "Starting and Stopping the System" chapter of the *System Administrator's Guide*.

Do not forget the super-user password. To restore a forgotten super-user password, you must reinstall your UNIX System.

55. The following messages are displayed:

```
Store the password in a safe place.  You will need it to log in.

The password for "root" can be changed by logging in as "root"
and invoking the command 'passwd.'

Installation and configuration of the System V Operating System
is now complete.
AFTER you see the message  **    Safe to Power Off    **
                                       - or -
                           ** Hit Any Key to Reboot **

reboot the system by opening the floppy door and pressing any key.

The screen will clear and you will see the boot message:

    Boot

    :

Press RETURN to reboot the newly installed system.
```

56. Follow the instructions. You then see:

```
**    Safe to Power Off    **
          - or -
** Hit Any Key to Reboot **
```

Press ⟨Return⟩ and the system shuts down. Be sure to remove any floppy disk that is in the drive.

57. Press any key to reboot the system and press ⟨Return⟩ when the boot prompt appears:

```
Boot
:
```

58. The following is displayed:

```
hd(40)unix
```

The screen clears and you see some self-check diagnostics.

59. You see the following:

```
INIT: SINGLE USER MODE

Type CONTROL-d to continue with normal startup,
(or give the root password for system maintenance):
```

Press ⟨Ctrl⟩d to continue.

60. You are then asked to set the system time. Unless the clock battery is depleted, you should not need to set the time. Press ⟨Return⟩ to continue.

61. As the system starts up, messages from each of the services are displayed (such as the print service). You are also prompted for checking the tcb (Trusted Computing Base) protected subsystem databases; simply enter **n** and press ⟨Return⟩.

When the startup is completed, the system then presents a login prompt and is ready for users to log in.

62. If you plan to use electronic mail, you need to create a password for the MMDF account. Log in as *root* and enter the following command:

     passwd mmdf

     You are then prompted to create a password just as you did for the *root* account. You use this password when you need to administer the mail routing system.

63. You should now create an Emergency Boot Floppy Set for your system. These disks allow you to recover your root filesystem quickly should it ever become corrupted and you cannot start up from your hard disk. Proceed to Appendix C, "Creating an Emergency Boot Floppy Set," in this guide. This will save you hours that would otherwise be spent reinstalling the system from scratch. Note that regular backups should be made of your filesystems so that, should any corruption occur, you have something to restore.

64. If you wish to add additional hard disks, follow the instructions in the "Adding Hard Disks" chapter of the *System Administrator's Guide*.

Appendix A

Troubleshooting Your Installation

Introduction

Sometimes errors occur during the installation procedure. These may happen as you install the software, or they may cause problems when you boot immediately after installation. Most often, there is no problem with the software or the procedure itself. Occasionally there is a problem with the hardware, but most are minor, such as improperly connected cables. This appendix describes what to do when some common difficulties arise. If you have difficulty installing the software, this appendix describes some of the most common problems, how to avoid them, and how to fix them if they happen.

If you do not find your problem described in the sections that follow, use "Solving Undocumented Problems" to try and identify your problem. If your system hangs mysteriously, this section can help eliminate some of the more common difficulties. (Additional troubleshooting information is also found in the "Troubleshooting Your System" chapter of the *System Administrator's Guide*.) If you cannot solve your problem and you must contact your provider for help, be sure and record your system information as described in "Before Calling for Help" at the end of this appendix.

During the installation procedure, do not assume that you know what is about to happen, even if you have installed the system before. Read the installation documentation closely.

Solving Problems During Installation

This section covers some common problems that you may have while installing the software.

System Does Not Boot from the N01 (Boot) Floppy

If the system does not boot from the Boot floppy as described at the beginning of the installation procedure, check the following:

1. Verify that the N01 (Boot) floppy is in the drive and that the door to the floppy drive is completely closed. If another floppy is in the drive, the system does not display an error message; the system simply does not boot.

2. If the Boot floppy still does not boot, verify that your floppy drive works by booting an MS-DOS disk.

3. If the floppy drive does not work, you may have damaged your Boot floppy. If this is the case, and you do not have a backup copy, call your provider to arrange for a new Boot floppy.

Error Reading a Floppy

If an error occurs while reading a floppy, check the following:

1. Verify that the correct disk is in the floppy drive.

2. Make sure that the floppy is inserted correctly. (See your owner's manual if you do not know how to insert the floppy correctly.)

3. Verify that the door to the floppy drive is completely closed after you insert the floppy.

4. If you still see the read error message, tap the edge of the floppy disk lightly against a hard surface, such as a table top. This should be done carefully because you can damage the floppy. Try inserting the floppy disk again.

5. If the error message persists, call your provider to get a new floppy.

System Reboots from N1 or Screen Blanks After Boot: Prompt

If you cannot install because the system keeps rebooting from the N1 floppy or the screen blanks after pressing ⟨Return⟩ at the Boot: prompt, one of two known situations may be causing this problem:

- an improperly configured EGA adapter

- an incompatible VGA adapter

If you have an EGA or VGA adapter, check the following:

- Verify that the the adapter is supported. Check the supported hardware Appendix in the *Release Notes*.

- Make sure that the switches on the adapter are set correctly.

    Many cards have emulation modes; you should use the card in its native mode. You can also experiment with the EGA/VGA/CGA/MONOCHROME switches.

If the card has an AUTOSWITCH feature, the system can also hang when H6 is displayed during boot. See the next section, "Hardware Self-Check Stops at H6" for information on correcting this problem.

Hardware Self-Check Stops at H6

When you start the installation from the N volumes, the screen displays information about your hardware configuration, followed by a series of diagnostic letters. These letters display quickly and overwrite each other, so they are not normally visible unless the startup process halts unexpectedly. If you have an EGA or VGA adapter and the screen display stops at H6, the adapter card may be improperly installed. Shut the computer off and check your adapter's documentation.

If your graphics card has the AUTOSWITCH feature, it must be disabled to install the UNIX system. The documentation included with your graphics card should indicate how to disable AUTOSWITCH. This is typically controlled by setting a small switch on the card to the off position. You can then restart the installation from the beginning. If the problem persists, contact your provider for support.

Another symptom of this problem is observed when the boot prompt is displayed:

```
Boot
:
```

If you are using an AUTOSWITCH EGA card that normally displays in high resolution (EGA or VGA mode) and this prompt is displayed in low resolution (CGA mode), reset the machine until the high-resolution display appears. (Standard CGA text is low-resolution; dark lines are visible through the characters. EGA and VGA text is high resolution; no dark lines are visible.)

System Does Not Boot from the Hard Disk

If the system does not boot from the hard disk as described near the end of the installation procedure, you may see a message such as this, or another kind of error message:

```
PANIC: iinit
```

If you have an ST506 or ESDI disk and you did not run a bad track scan during installation and the boot block was written on a bad track, the system does not boot from the hard disk. (If you selected the Automatic Initialization to initialize your hard disk automatically, your disk was scanned for bad tracks.)

Whatever the reason for this problem, you must reinstall your UNIX system.

If the operating system still does not boot, run the hardware diagnostics that came with your computer and hard disk.

Solving Problems After Installation

This section describes some common problems that you may encounter when you boot the system immediately after installing the software.

Hardware Does Not Work Under the UNIX System

If some hardware (for example, a tape drive) does not seem to work with the UNIX system installed, although it works fine under another operating system, the hardware may not be supported by the UNIX system.

Refer to the "Compatible Hardware" section in the *Release Notes* for information on the hardware that you can use with the UNIX system.

UNIX System and DOS Do Not Work

If you install the UNIX system after installing DOS, and both operating systems do not work, you need to back up your DOS files and reinstall both systems. You should make certain that you followed the guidelines found under "Creating and Formatting a Physical DOS Partition" in chapter 1 of this guide.

Problems Booting on a Disk with Greater Than 1024 Cylinders

If your hard disk has more than 1024 cylinders and your system hangs mysteriously or displays one of the following error messages at boot time:

    bn void *number*

    /boot not found

    unix not found

    Bad magic number

The problem may be that the boot information lies beyond the 1024 cylinder boundary.

Solving Problems After Installation

If this happens, you must reinstall your UNIX system, run the manual hard disk initialization, and rearrange your filesystems so that the root filesystem is located within the first 1024 cylinders.

Because this limitation is expressed in cylinders and UNIX **fdisk**(ADM) uses tracks, you should determine the number of tracks per cylinder for your disk. To do this, follow the instructions in "Converting fdisk Numbers" in Chapter 1, "Before You Start" in this guide.

If your disk does not have more than 1024 cylinders, these error messages may indicate other problems. See the section on solving boot problems in the "Troubleshooting Your System" chapter of the *System Administrator's Guide*.

Common System Resource Error Messages

When system limits are exceeded, the operating system advises you by displaying messages on the console. Some of the messages are advisory only. Others precede a system panic: the system displays some additional diagnostic messages and then "hangs," requiring you to reboot. You can expand these limits by reconfiguring values known as *tunable kernel parameters*. The kernel should not be reconfigured because a system resource error message was received once, or even a couple of times, but when a single message persists between system sessions.

A

Table A.1

Error Messages and Associated Tunable Parameters

Error Message	Parameter	Category
iget - inode table overflow	NINODE*	3
Timeout table overflow	NCALL	5
File table overflow	NFILE	3
No more processes (system-wide)	NPROC	4
No more processes (per-user)	MAXUP	4
Region table overflow	NREGION	4
Too many open files	NOFILES	3
out of queues	NQUEUE	11
out of streams	NSTREAM	11

*   The parameters NINODE and NS5INODE must always have the same value; if you increase NINODE you must do the same to NS5INODE.

If you encounter any of the messages listed in Table A.1, note the name of the parameter and the category number. Read the instructions found in "Reallocating Kernel Resources with configure" in the "Tuning System Performance" chapter of the *System Administrator's Guide*. If you need to adjust a resource, first try to increase the value by a small amount. If the problem persists, increase it by 100 percent or more of its original value. If the problem is still not solved, more detailed research is required to locate the exact program and sequence that cause the error.

Solving Undocumented Problems

If your problem is not described in this appendix, or in "Troubleshooting Your System" in the *System Administrator's Guide*, this section can help you to isolate, identify, and solve the problem.

Hardware or Software?

It is important to characterize a problem as software or hardware. In general, hardware problems are intermittent, but software problems are consistent and easily reproduced.

Hardware under the UNIX System and MS-DOS

The fact that a given piece of hardware works under MS-DOS is no guarantee that it will work with the UNIX system. A critical difference between the UNIX system and DOS is the way they access hardware. One way DOS or an application under DOS can read or write information to a device controller (disk controller, tape controller, serial/parallel etc.) is to make a call to the BIOS (Basic Input Output System) which then takes the data and reads/or writes it to the appropriate device. Except for very short periods of time during installation and during the boot process, the UNIX system never uses the BIOS.

DOS or an application makes a device-independent call to the BIOS to transfer data. The BIOS takes this device-independent call and translates it into a device-dependent set of instructions to transfer data to or from a particular device. Under the UNIX system, device drivers handle many of the functions for which DOS can use the BIOS. By writing code that reads/writes directly to the device, DOS can also use devices without going through the BIOS. The ability to write directly to a device is one reason why some hardware works under DOS, but not under the UNIX system. Because the UNIX system does not make use of the BIOS, it expects a piece of hardware to be at a specific interrupt, DMA channel and base address, and only recognizes the hardware if it is configured properly.

Identifying Your Problem

If the system hangs mysteriously, whether at boot time, during installation, or shortly thereafter, use the steps below to isolate and identify the problem:

1. Confirm that your hardware is listed as supported in the *Release Notes*. If not, we recommend that you use supported hardware.

2. If possible, see if a suspect component works on another machine with the same configuration (under the UNIX system, not MS-DOS).

3. If any third-party drivers are installed, such as those supplied with multiport cards, remove them, relink the kernel and see if the problem persists.

4. Make certain that your devices are recognized at bootup. Watch the boot display, check */usr/adm/messages*, or use the **hwconfig**(C) utility.

5. Check for hardware conflicts between components, including DMA, interrupts, and memory addresses. The information displayed by **hwconfig** or found in */usr/adm/messages* can be useful in locating a conflict. Figure A-1 is a sample display from */usr/adm/messages*. This display shows no conflicts in the address, vector, or dma columns. The display for your machine may indicate a conflict. Although this display is useful, the hardware settings should be double-checked to make certain they are in agreement. Be certain you have checked for documented incompatibilities or limitations in Appendix A of your *Release Notes*.

```
device    address          vector dma comment
----------------------------------------------------------------------------
%serial   0x03F8-0x03FF 04      -   unit=0 type=Standard nports=1
%serial   0x02F8-0x02FF 03      -   unit=1 type=Standard nports=1
%floppy   0x03F2-0x03F7 06      2   unit=0 type=96ds15
%console  -             -       -   unit=ega type=0 12 screens=68k
%parallel 0x0378-0x037A 07      -   unit=0
%tape     0x0338-0x033C 05      1   type=W
%disk     0x01F0-0x01F7 16      -   type=W0 unit=0 cyls=286 hds=16 secs=63
```

Figure A-1 Sample Boot Display

6. If your machine has features such as shadow RAM or memory caching, disable them. These features can have unpredictable results. If you have a caching controller, for example, you can try disabling the caching until after the UNIX system is installed.

7. If you have a DOS partition installed, be sure it follows the the guidelines found under "Creating and Formatting a Physical DOS Partition" in Chapter 1 of this guide.

8. If your hard disk has more than 1024 cylinders, it must observe the restrictions found under "Installing on Disks with Greater Than 1024 Cylinders" in Chapter 1 of this guide. See "Problems Booting on a Disk with Greater Than 1024 Cylinders" in this appendix for more information.

9. If you have a QIC-40 or QIC-80 mini-cartridge tape drive installed, the system can fail unpredictably if it is not installed correctly. Check the following:

    • the tape device must not be configured as the third device on the controller. (This is not supported under the UNIX system as it is under MS-DOS.) You should always configure the drive as the second device, unless you have a 4-device controller, where it can be the fourth device.

    • the jumpers on the drive must be configured properly.

    • you must use your computer's setup program to indicate there is no floppy device attached.

10. If your video card is incorrectly installed, the system can also fail unpredictably. Check the following:

    • check the section "System Reboots from N1 or Screen Blanks After Boot:" under "Solving Problems During Installation" in this appendix.

    • there are known conflicts between video cards and network cards. Attempts to send or receive data from the network card can be blocked. This problem can be resolved if you avoid using IRQ2 (interrupt vector 2) for your network card. Some graphics cards use the additional interrupt, causing the conflict to occur. Check the Appendix A of your *Release Notes* for warnings that apply to specific cards and card combinations.

    • Known conflicts exist between 16-bit VGA boards and floppy or tape data transfer. We recommend that you use 8-bit VGA boards, or that you put 16-bit boards in 8-bit mode. Consult your hardware documentation for more information.

11.　There can be conflicts involving hardware clock rates. Check your components against the clock rate for your computer and the components that you have installed. Try lowering the machine speed.

12.　If you did a low-level format of your hard disk with a third-party format program, you may have a format that does not work. Format programs that are known to work are DOS Debug and Speedstor.

A

Before Calling for Help

If your problem is not discussed in the troubleshooting information in this chapter or "Troubleshooting Your System" in the *System Administrator's Guide*, and you cannot isolate the problem using "Solving Undocumented Problems," you can call your provider for help. Before doing this, you should enter critical information in the tables included in this section so that your problem can be analyzed and dealt with quickly. This includes a description of your problem and your system configuration.

A Description of the Problem

You should write down a complete description of your problem, including the precise series of commands or steps taken that lead to the problem. Include any error messages displayed; write the error message down exactly as it appears, complete with any punctuation and upper-case characters.

System Configuration

Knowing the hardware and software configuration of your system is vital to a correct diagnosis of your problem. The process is greatly speeded up if this information is on hand when speaking to your provider. List all the hardware components, including their brand names and model numbers. You should also list all applications and third-party device drivers you have installed.

Problem Description
(include steps to duplicate problem and error messages, if applicable)

A

Hardware Configuration		
Component	**Brand Name**	**Model**
Computer		
Monitor		
Processor Type		
Processor Speed		
Coprocessor		
Memory Size		
Floppy Drive(s)		
Video Card		
Hard Disk(s)		
Controller or Host Adapter		
Tape Drive/Controller		
Network Adapter		
Mouse		
Serial Card		
Printer		
Modem		
Other Device		

Software Configuration: Applications	
Product Name	**Release Number**

Appendix B

Installing and Removing Additional Software

Introduction

The **custom**(ADM) utility installs and removes UNIX System software and UNIX applications on your system. **custom** has three levels of operation: Entire Product, Service, and Service Component. These levels function as follows:

Entire Product   The entire product distribution is installed. This selection installs new products.

Service   Groups of components that make up a functional area are installed.

Service Component An individual component, its packages, or individual files are installed. For example, the UNIX System Extended Utilities consists of several packages, such as MAIL (mail-related utilities) and LPR (printing utilities).

For example, an Entire Product can consist of several services. In turn, a Service Component can include a number of packages. A package is a collection of individual files. Files are extracted or deleted in packages.

The UNIX System consists of a dozen packages. This chapter explains how to do the following:

- Install additional products.

- Install packages of the UNIX System.

- Remove software from the system.

If you have previously installed only selected packages of the UNIX System and you wish to install others, consult the "Installing UNIX System Packages" section later in this appendix.

Installing Additional Products

This section describes how to install additional products or applications that are **custom**-installable.

1. To install other applications, make the following **sysadmsh** selection:

    System→Software

2. The main **custom** menu is displayed:

```
                                                              Custom

  Install   Remove List Quit
  Install software
                                         Friday August 31, 1990 1:06
   /

  ─────────────────── Products Currently Installed ───────────────
  SCO System V Operating System
```

The menu is already set to select Install; press ⟨Return⟩ to continue.

3. You see the next screen:

```
                                                              ┌─────────┐
                                                              │ Install │
 Select a product to install and press <Return>              └─────────┘
 Press <ESC> to cancel, movement keys are active
 /                                          Friday August 31, 1990 1:06



      Select a product    :     [                          ]

      Choose an option    :     [ Entire Product ]    Packages    Files




                              ┌──────────────────────────────────┐
                              │ *A New Product                    │
                              │  SCO System V Operating System    │
                              └──────────────────────────────────┘
```

A New Product is highlighted. Press ⟨Return⟩ and the Entire Product option is highlighted. Press ⟨Return⟩ once again.

4.   The following menu is displayed:

```
                                                    ┌─────────┐
                                                    │ Install │
                                                    └─────────┘
Insert the requested volume and press <Return> to continue the installation
 /                                           Friday August 31, 1990 1:06



    Insert:   Distribution
              Floppy Volume 1

  ┌────────┐
  │Continue│  Quit
  └────────┘
```

Insert the first disk of your product distribution as instructed and
press ⟨Return⟩. Shortly after you do so, you are prompted again to
insert the first volume, this time by its actual name. Simply press
⟨Return⟩ and insert additional volumes as prompted.

5.   When the product installation is complete, you are returned to the
custom menu. If you are finished, exit **custom** by selecting Quit
from the main **custom** menu and confirming your selection.
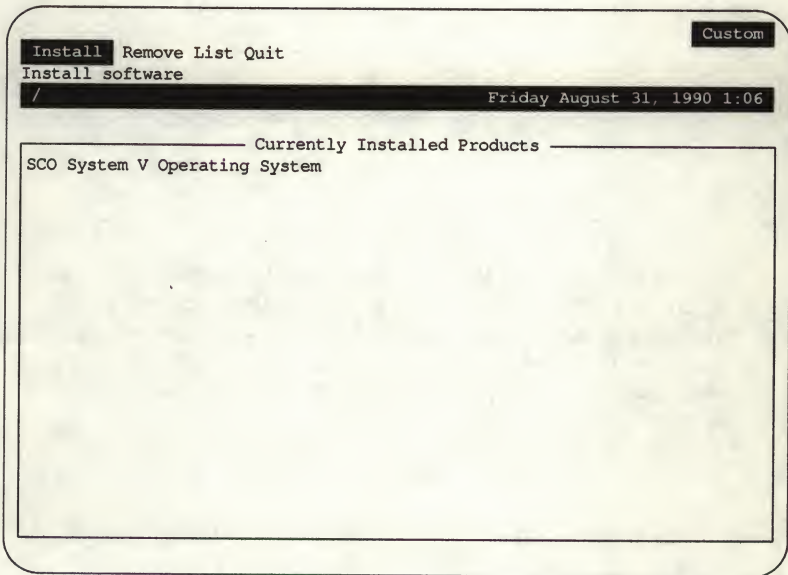
Installing UNIX System Packages

This section describes how to install UNIX System packages.

1. To perform the installation, make the following **sysadmsh** selection:

   System→Software

2. The main **custom** menu is displayed:

```
┌─────────────────────────────────────────────────────────────────────┐
│                                                          ┌─────────┐  │
│  Install  Remove List Quit                               │ Custom  │  │
│  Install software                                        └─────────┘  │
│  /                                      Friday August 31, 1990 1:06   │
│  ───────────────────── Currently Installed Products ───────────────── │
│  SCO System V Operating System                                        │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘
```

The menu is already set to select Install, for installing software; press ⟨Return⟩ to continue.

3. You see the next screen:

```
                                                        ┌─────────┐
                                                        │ Install │
Select a product to install and press <Return>         └─────────┘
Press <ESC> to cancel, movement keys are active
  /                                    Friday August 31, 1990 1:06


        Select a product   :    [                         ]

        Choose an option   :    [ Entire Product ]    Packages    Files




                           ┌──────────────────────────────────┐
                           │ *A New Product                    │
                           │  SCO System V Operating System    │
                           └──────────────────────────────────┘
```
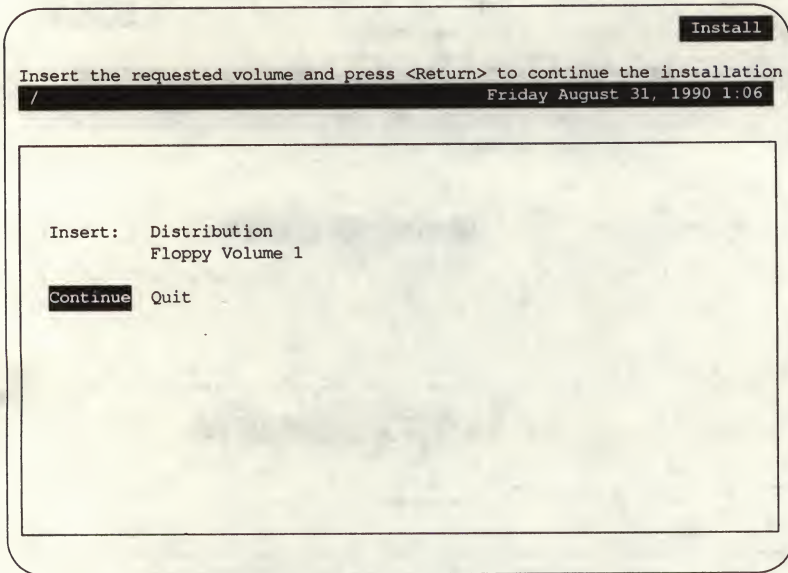
Use the ⟨Down Arrow⟩ key to highlight the SCO System V Operat-
ing System and press ⟨Return⟩. The Entire Product option is then
highlighted. If you want to install the entire operating system, you
should press ⟨Return⟩ again. If you want to select the packages to
install, use the ⟨Left Arrow⟩ key to highlight the Packages option
and press ⟨Return⟩.

4. After a moment you see the following:

```
                                                              Install
Install the complete distribution
/                                      Friday August 31, 1990 1:06



    Choose an option :   Entire Product    Services    Service Components
```

Use the ⟨Left Arrow⟩ key to highlight Service Components and press ⟨Return⟩.

5. You see the next screen:

```
                                                            ┌─────────┐
                                                            │ Install │
 Select service component(s) to install and press <Return> └─────────┘
 Press <ESC> to cancel, movement keys are active
 /                                        Friday August 31, 1990 1:06
 ┌──────────────────────────────────────────────────────────────────┐
 │                                                                    │
 │                                                                    │
 │                                                                    │
 │  Choose an option  :  Entire Product   Services   Service Components│
 │                                                                    │
 │                                                                    │
 │                                                                    │
 │                                                                    │
 │                                                                    │
 │                         UNIX Operating System                      │
 │ SCO System V Runtime System                                        │
 │ SCO System V Extended Utilities                                    │
 │                                                                    │
 └──────────────────────────────────────────────────────────────────┘
```

Use the ⟨Down Arrow⟩ key to select SCO System V Extended Utilities and press ⟨Return⟩.

6. You see this screen:

```
                                                          ┌─────────┐
Install the entire product                                │ Install │
Press <ESC> to cancel, movement keys are active           └─────────┘
/                                          Friday August 31, 1990 1:06

┌─────────────────────────Install─────────────────────────────┐
│                                                              │
│                                                              │
│     Select a product   :    SCO System V Extended Utilities  │
│                                                              │
│     Choose an option   :   ┌──────────────┐                  │
│                            │Entire Product│  Packages  Files │
│                            └──────────────┘                  │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
└──────────────────────────────────────────────────────────────┘
```

The Entire Product option is highlighted. Use the ⟨Left Arrow⟩ key to highlight Packages and press ⟨Return⟩.

7. Next, data files are loaded and you see the list of operating system packages similar to the following:

Installing UNIX System Packages

```
┌──────────────────────────────────────────────────────────────┐
│                                                  ┌─────────┐   │
│                                                  │ Install │   │
│ Select package(s) from which to choose files and press <Return>│
│ Press <ESC> to return, movement keys are active               │
│ ▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁▁ │
│ /                                       Friday August 31, 1990 1:06│
│  ┌─────────────────────────Install──────────────────────────┐ │
│  │                                                            │ │
│  │ Select a product   :    SCO System V Extended Utilities    │ │
│  │                                                            │ │
│  │                                                            │ │
│  │ Choose an option   :     Entire Product   [ Packages ]  Files│ │
│  │                                                            │ │
│  │           ┌──────── SCO System V Extended Utilities ──────┐ │ │
│  │           │ Name     Inst    Size      Description        │ │ │
│  │           │ *ALL     Part    18688    Entire Extended Utilities │ │
│  │           │ BACKUP   No      254      System backup & recovery tools│ │
│  │           │ BASE     Part    1406     Basic extended utility set│ │
│  │           │ CSH      No      126      The C-Shell          │ │ │
│  │           │ DOS      No      368      DOS Utilities        │ │ │
│  │           │ KSH      No      208      The K-Shell          │ │ │
│  │           │ EX       No      406      The ex and vi editors│ │ │
│  │           │ FILE     Part    480      File manipulation tools│ │
│  │           │ LAYERS   No      194      System V Layers      │ │ │
│  └───────────┴─────────────────────────────────────────────┘ │ │
└──────────────────────────────────────────────────────────────┘
```

You can move up and down the list using the arrow keys. If you wish to select several packages to install, use the ⟨Space⟩ bar to mark each one with an asterisk (*). When you press ⟨Return⟩, each item you have marked is installed. Note that you can add all available packages by selecting ALL.

Refer to "Packages in This Set" in your *Release Notes* for a list of operating system packages.

8. You are then prompted to insert the necessary distribution volumes. When the packages are completely installed, you return to the main **custom** menu.

9. When you are finished installing UNIX packages, exit **custom** by selecting Quit from the main **custom** menu and confirming your selection.

Removing Software from the System

For the most part, removing software from the system, whether in products, services or service components, or packages, follows the same procedure as installing them. You need only select Remove from the main **custom** menu and select the software just as you did at installation time. Products that include special drivers will relink the kernel and thus remove these drivers. In addition, certain special procedures may apply to different products.

B

Appendix C

Creating an Emergency Boot Floppy Set

Introduction

The Emergency Boot Floppy Set is an important tool used in administering your system. It allows you to recover your system in the event of a catastrophic system failure, where the computer does not respond when you attempt to start it. You can use these diskettes to restore a corrupted root filesystem without reinstalling the operating system. If you have more than one system, you should make one Emergency Boot Floppy Set for each machine. Because each machine has a unique emergency set, a set made on one system does not work with any other system. Be sure to keep these diskettes separate; if you use an emergency floppy set on the wrong machine, it does not work and further corruption may result.

The utility used to create the Emergency Boot Floppy Set is called **mkdev fd**. It is a menu-driven program that creates three types of disks: simple filesystem (described in "Using Floppy Disks and Tape Drives" in the *System Administrator's Guide*) and the two used in the Emergency Boot Floppy Set, bootable only and one root filesystem only. You must create one bootable and one root filesystem disk to make up your set. The formats supported are: 48 tpi, 96 tpi-15 sectors or track in the 5-1/4 inch format, and 135 tpi-9 sectors or track in the 3-1/2 inch format.

C

Creating the Floppies

To create your set of floppies, follow this procedure:

1. Log in as *root* and enter:

    mkdev fd

    Δ **sysadmsh** users select: Filesystems→Floppy

2. You see the following display:

    ```
    Floppy Disk Filesystem Creation Program

           Choices for type of floppy filesystem.

           1. 48tpi, double sided, 9 sectors per track
           2. 96tpi, double sided, 15 sectors per track
           3. 135tpi, double sided, 9 sectors per track
           4. 135tpi, double sided, 18 sectors per track

    Enter an option or q to quit:
    ```

    Enter the number of the disk type desired and press ⟨Return⟩.

3. Next you see:

    ```
    Choices for contents of floppy filesystem.

    1. Filesystem
    2. Bootable only         (96ds15 and 135ds18 only)
    3. Root filesystem only  (96ds15 and 135ds18 only)

    Enter an option or enter q to quit:
    ```

    Create the bootable disk first; enter **2** and press ⟨Return⟩.

4. You see the following prompt:

    ```
    Insert a type floppy into drive 0.
    Press Return to continue or enter q to quit:
    ```

    Press ⟨Return⟩.

5. The following prompt is displayed:

```
Would you like to format the floppy first? (y/n)
```

If you have already formatted the floppy, enter **n** and the filesystem is immediately created. If the floppy has not yet been formatted, enter **y** and you see:

```
formatting /dev/type
track 00 head 0
```

The track and head numbers count up as the floppy is formatted. (If */etc/default/format* contains VERIFY=Y, the format is also verified after formatting.)

6. The following is displayed:

```
Successfully created filesystem.

Copying files to /dev/type ...
```

The bootable disk is then generated by creating a filesystem and copying the relevant files from the root filesystem. **mkdev** also checks the filesystem with **fsck**(ADM); messages similar to the filesystem check displayed at boot time are displayed.

7. The following message is displayed when the disk is ready:

```
type floppy created and checked successfully
```

8. You are then returned to the main menu. You should now create the root filesystem diskette. Enter **3** and press ⟨Return⟩.

9. You see the following prompt:

```
Insert a type floppy into drive 0.
Press Return to continue or enter q to quit:
```

Press ⟨Return⟩.

Creating the Floppies

10. The following prompt is displayed:

```
Would you like to format the floppy first? (y/n)
```

If you have already formatted the floppy, enter **n** and the filesystem is immediately created. If the floppy has not yet been formatted, enter **y** and you see the formatting messages described earlier.

11. The following messages are displayed:

```
Copying files to /dev/type root filesystem ...

Copying special files to /dev/type root filesystem ...
```

12. As with the bootable floppy, **mkdev** also checks the filesystem with **fsck**(ADM); similar messages are displayed.

13. The following message is displayed when the disk is ready:

```
type floppy created and checked successfully
```

Store these diskettes in a safe place. You will need them if your system becomes corrupted and is no longer bootable.
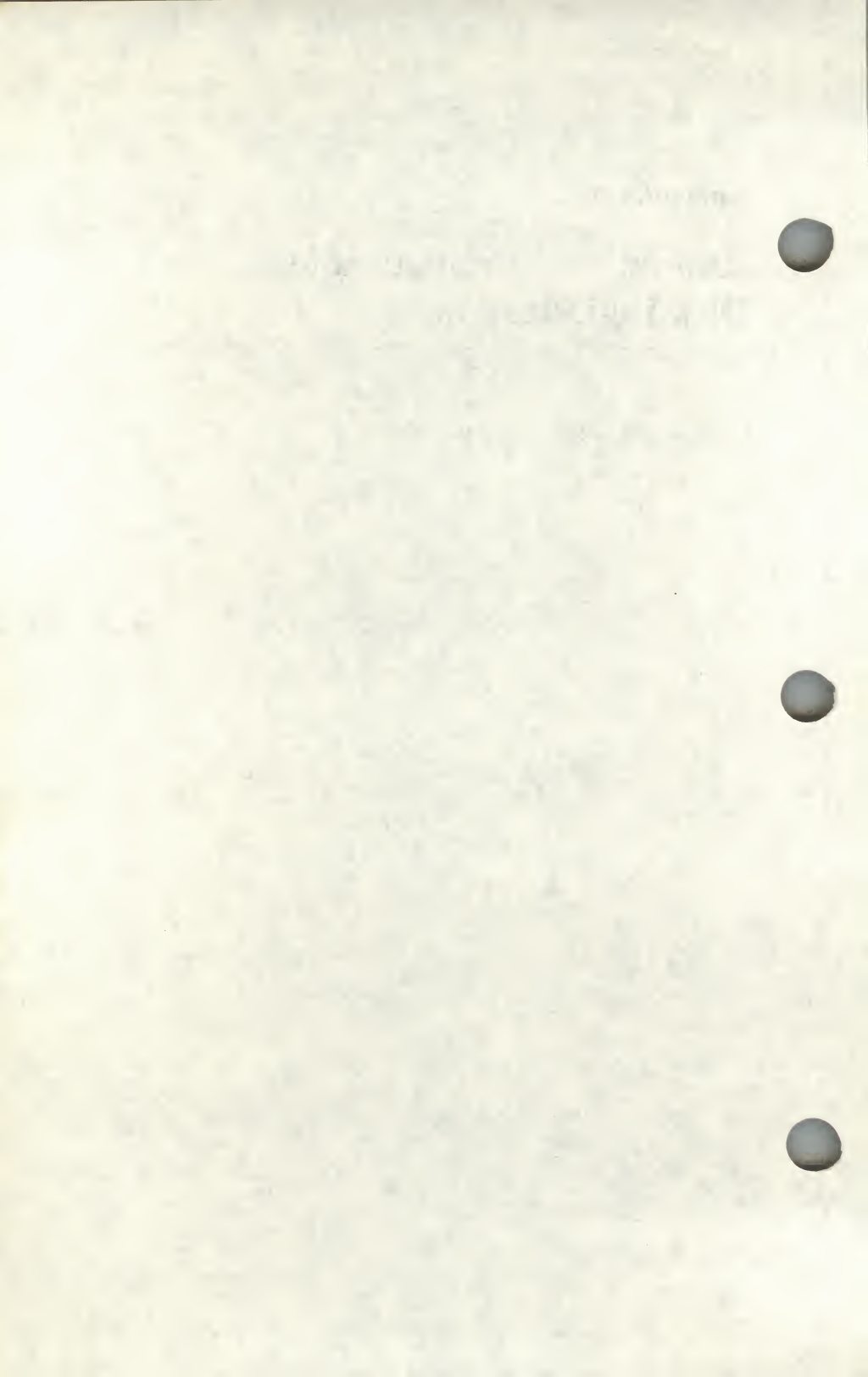
Appendix D

Running the Configurable
Disk Initialization

Configuring Your Hard Disk

This appendix describes how to initialize the hard disk manually, including the configuration of non-standard hard disks (disks for which there is no existing entry in the ROM BIOS). This involves mapping bad spots (bad tracks) on the disk that are avoided by the operating system, as well as dividing the disk into partitions (separate areas occupied by different operating systems) and filesystems (separate areas for directories under the same operating system).

There are three types of hard disks and controllers: ST506 (standard), ESDI, and SCSI. (Refer to your *Release Notes* for more information on disk and controller types.) The ESDI and SCSI disks and controllers may have certain steps that do not apply to standard disks; these steps are clearly indicated.

The Configurable disk initialization proceeds as follows:

1. The system first detects the type of controller and disk you have installed and displays messages similar to this example (for a SCSI configuration):

    ```
    %disk -      -      -      type=S ha=0   id=0   lun=0
    %Sdsk -      -      -      cyls=80        hds=64 secs=32
    ```

2. The following messages are displayed:

    ```
    During installation you may choose to overwrite all
    or part of the present contents of your hard disk.

    Do you wish to continue? (y/n)
    ```

    This prompt is a chance to stop the process if you have restarted the installation process by mistake. Enter **y** to continue.

3. If you have a SCSI controller, you see the following message:

```
The hard disk installation program will now invoke /etc/fdisk.
Entering 'q' at the following menu will exit /etc/fdisk.
and the hard disk installation will continue.

If you wish to exit the entire installation at this menu,
press the <DEL> key.
```

Skip to step 9.

Note

The SCSI installation skips steps 4-8.

4. If you have an ST506 (standard interface) controller, you see the following message and prompt:

```
The hard disk installation will now invoke /etc/dkinit.
Entering 'q' at the following menu will exit /etc/dkinit,
and the hard disk installation will continue.

If you wish to exit the entire installation at this menu,
press the <DEL> key.

Hard Disk Drive 0 Configuration

        1. Display current disk parameters
        2. Modify current disk parameters
        3. Select default disk parameters

Enter an option or 'q' to quit:
```

5. If you have an OMTI controller, you see the following additional message:

```
Caution: Consult the ESDI installation Release Notes if
you wish to modify the disk parameters the /etc/default
will display.
```

If you enter **q**, you see the following message:

```
The hard disk installation program will now invoke two disk
preparation utilities:  fdisk and badtrk.
Selecting 'q' at the main menu for each utility will exit
that utility and continue with the hard disk installation.
```

Skip to step 9.

6. The **dkinit** menu is intended for unusual or non-standard disks. If
    you have a standard hard disk, one that is supported by your com-
    puter hardware or special motherboard ROM, enter **3** followed by
    ⟨Return⟩ to continue the installation. In addition, if your disk is a
    SCSI, you must also enter **q**; the parameters are already set.

    Entering **q** at this point selects the default parameters for your hard
    disk. Unless you know that your disk is non-standard, assume that
    it is standard and enter **q** to continue your installation. Skip to step
    9.

    If your disk is non-standard, you must enter information that over-
    rides the ROM disk configuration information, replacing it with the
    new information. If you are unsure of what parameters to enter for
    your non-standard disk, contact your disk manufacturer for this in-
    formation.

    If you enter **1** or **2**, you see the following display:

```
    Disk Parameters    Values
    1. Cylinders       value
    2. Heads           value
    3. Write Reduce    value
    4. Write Precomp   value
    5. Ecc             value
    6. Control         value
    7. Landing Zone    value
    8. Sectors/track   value
```

In the actual display, *value* is replaced with the default value for
that variable.

Note

> The "Cylinders" value refers to the number of cylinders on the entire hard disk and should not to be confused with the number of cylinders you allocated (or intend to allocate) to a given partition.

If you entered a **1**, you now see the first menu again. If you entered a **2**, you are now prompted:

```
Enter a parameter to modify or 'q' to return to the main menu:
```

Enter any number from **1** to **8** to change the disk parameters, or **q** to return to the previous menu.

7. You see the following:

```
Enter the new value or <RETURN> to use the existing value:
```

If you wish to change the value, enter a new value now or press ⟨Return⟩ to use the existing value.

8. After you finish changing the disk parameters, enter **q** to return to the main menu. Next, enter **q** again to save the changes you made. Exiting from **dkinit** by entering q overwrites any parameters you have changed with the new values. If you wish to restore the default parameters after making modifications, enter **3** from the first menu.

9. The installation program next runs the **fdisk**(ADM) utility to partition the hard disk. You can partition your disk to support DOS on the same hard disk (if you have DOS already installed), or you can use the whole disk for your UNIX system.

After a moment, the **fdisk** menu appears on the screen. You see this option list:

```
            1. Display Partition Table
            2. Use Entire Disk for UNIX
            3. Use Rest of Disk for UNIX
            4. Create UNIX Partition
            5. Activate Partition
            6. Delete Partition

      Enter your choice or 'q' to quit:
```

Select option **1** and press ⟨Return⟩.

If you have never installed an operating system on your disk, you see a table similar to this:

```
   Current Hard Disk Drive: /dev/rhd00

    ┌──────────┬────────┬──────┬───────┬─────┬──────┐
    │Partition │ Status │ Type │ Start │ End │ Size │
    │          │        │      │       │     │      │
    │          │        │      │       │     │      │
    └──────────┴────────┴──────┴───────┴─────┴──────┘

   Total disk size: 1220 tracks (5 reserved for masterboot
                                    and diagnostics)
   Press <RETURN> to continue
```

If you have previously installed an operating system on your disk, the **fdisk** table is filled in. DOS is usually displayed as partition number 4.

10.   Press ⟨Return⟩ to return to the main **fdisk** menu. If you would like the UNIX partition to occupy the whole disk, select option **2**. After you have made your selection, quit out of the **fdisk** menu by entering **q**. If any other operating systems were previously installed on your system, you also see the following warning message:

```
   Warning! All data on your disk will be lost!
   Do you wish to continue? (y/n)
```

Enter **y** and press ⟨Return⟩ only if you want your UNIX System to occupy the whole disk. This ensures that **fdisk** partitions the whole disk.

Note

> If you choose option 3, which allocates the remainder of the hard disk for the UNIX System, you must next activate the UNIX partition by selecting option 5. If you do not activate the UNIX partition, your first partition is activated.
>
> Most computers have diagnostic programs that write to the last cylinder of the hard disk. This means that the last cylinder should not be allocated to a partition. The last cylinder is not allocated when you choose option 2 from the **fdisk** menu. If you choose option 4, you should not allocate the last cylinder of the hard disk to the UNIX partition.

11. Press ⟨Return⟩, and you see the main **fdisk** menu. You have now set up the partition(s) on your hard disk. To continue with the next step in the installation procedure, enter **q** and press ⟨Return⟩.

    If you have an ST506 or ESDI controller, continue with step 12.

    If you have a SCSI controller or an SMS-OMTI ESDI controller, skip to step 21.

Note

> The SCSI and SMS OMTI installation does not run **badtrk** (steps 12-20). The SMS OMTI is the only ESDI controller that does not run **badtrk**.

12. Now you see a menu from the program **badtrk**(ADM). With the **badtrk** program, you can scan your hard disk for defective tracks. The program maps any flawed locations to good tracks elsewhere on the disk. It also creates a bad track table, which is a list of all the bad tracks on your hard disk.

The main **badtrk** menu looks like this:

```
1. Print Current Bad Track Table
2. Scan Disk (You may choose Read-Only or Destructive later)
3. Add Entries to Current Bad Track Table by Cylinder/Head Number
4. Add Entries to Current Bad Track Table by Sector Number
5. Delete Entries Individually from Current Bad Track Table
6. Delete All Entries from Bad Track Table

Enter your choice or 'q' to quit:
```

Enter **2**, then press ⟨Return⟩.

13.   You see the following submenu:

```
1. Scan entire UNIX partition
2. Scan a specified range of tracks
3. Scan a specified filesystem

Enter an option or 'q' to quit:
```

Select option **1**.

14.   After you select the area you want scanned, you are given the fol-
       lowing choices:

```
1. Quick scan (approximately 7 megabytes/min)
2. Thorough scan (approximately 1 megabyte/min)

Enter an option or 'q' to quit:
```

Select option **2**.

15.   You are prompted:

```
Do you want this to be a destructive scan? (y/n)
```

Enter **y**. You are warned:

```
This will destroy the present contents of the region you are scanning.
Do you wish to continue? (y/n)
```

Enter **y** and press ⟨Return⟩. You see the following message:

```
Scanning in progress, press 'q' to interrupt at any time.
```

16. After you respond to the above prompts, the program scans the active partition of the new disk for flaws. The larger your disk, the longer the scanning process takes, so a very large disk may take a while.

   As **badtrk** scans the disk, it displays the number of each track it examines, and the percentage of the disk already scanned. Pressing the **q** key at any time interrupts the scan. If you press **q** to interrupt the scan, you do not need to press ⟨Return⟩. You are then prompted to continue scanning or to return to the main menu.

   Whenever **badtrk** finds a defective track, it lists the location of that track using both the sector number and cylinder or head conventions. Defective track information is entered into the table and displayed on the screen. Here is an example of a bad track:

```
WARNING: wd: on fixed disk ctlr=0 dev=0/47 block=31434 cmd=00000020
     status=00005180, sector = 62899, cylinder/head = 483/4
```

17. When the scan is complete, the menu reappears. Select option **1** to see the results of the scan. Your bad track table looks something like this:

```
Defective Tracks

       Cylinder    Head    Sector Number(s)
    ┌─────────────────────────────────────────┐
    │ 1.    190       3       12971-12987      │
    └─────────────────────────────────────────┘

Press <RETURN> to continue
```

Press ⟨Return⟩ to return to the main menu.

Note

If there is a flaw in the first few tracks of the UNIX partition, you are returned to the **fdisk** utility (see the previous installation step). Repartition the disk with **fdisk** so that the UNIX partition no longer includes the defective tracks. You have to experiment to determine how many tracks to exclude. Leave these defective tracks unassigned to any operating system. When you leave **fdisk**, **badtrk** is run again and you should scan the disk for further flaws.

This process continues until **badtrk** finds no flaws in the first few tracks.

---

18. If your disk comes with a flaw map, you should enter any flaws from it into the bad track table.

   Because most disk flaws are marginal or intermittent, your disk's flaw map probably lists more bad tracks than the scanning process reveals. If so, you should now add these defective tracks to the bad track table.

   Select either option **3** or option **4** depending upon the format of the flaw map furnished with your disk. Enter the defective tracks, one per line. If you make a mistake, enter **q** and press ⟨Return⟩. When you see the main **badtrk** menu, select option **5** to delete a track.

19. If your disk is not furnished with a flaw map, or you are finished making changes to the bad track table, enter **q** and press ⟨Return⟩.

20. You are next prompted for the number of tracks to allocate as replacements for those tracks that are flawed. You should allocate at least as many as the recommended number. Enter the number or just press ⟨Return⟩ to use the recommended number that is displayed:

```
Enter the number of bad tracks to allocate space for
(or press <RETURN> to use the recommended value of n):
```

If you press ⟨Return⟩ and do not enter an alternate value, **badtrk** allocates the recommended number of tracks as replacements. This number is based on the number of bad tracks currently in the table, plus an allowance for tracks that may go bad in the future. If you ever exceed the number of allocated bad tracks, you must reinstall the system.

21. Now that you have initialized your hard disk as appropriate to your configuration, it is time to control the actual layout of your hard disk filesystems. Next, the installation program runs the **divvy**(ADM) utility. This program allocates portions of your partitioned disk for the root and swap areas. It also allocates a small portion of the disk for a recover area that is used during autoboot by the **fsck**(ADM) program. **divvy** first prompts you for the swap-space allocation:

```
There are n 1K blocks in the UNIX area.
Between x and y 1K blocks should be reserved for the swap area.

Please enter the swap space allocation, or press <RETURN>
to get the default allocation of z 1K blocks:
```

The actual numbers in this prompt vary depending upon the size of your disk. Unless you have specialized needs, use the default values shown on your screen. (If you plan to install the Development System, enter a swap-area allocation that is at least 1000 blocks larger than the default.) Enter your swap-space allocation now or press ⟨Return⟩ to choose the default values.

If you have enough disk space for a /u filesystem, you see the prompt:

```
Do you want a separate /u filesystem? (y/n)
```

If you have enough storage for a separate user filesystem, and you want to create one, enter **y** and press ⟨Return⟩. If you do not wish to have one, respond **n** and proceed to the next step.

Next, you see:

```
Enter block allocation for the /u file system.
(min to max)
```

In the display, *min* and *max* are replaced with the minimum and maximum number of blocks that can be allocated for the filesystem.

22.   You are now prompted:

```
The layout of the filesystems and swap area is now prepared.

Do you wish to make any manual adjustments to the sizes or
names of the filesystems or swap area before they are created
on the hard disk? (y/n)
```

Enter **n** and press ⟨Return⟩. This option chooses the exact size of filesystems and the swap area to fit special needs. Most users do not need this kind of precise control, so answering **n** at this prompt causes **divvy** to use default settings based on the size of your hard disk.

23.   The system now creates the filesystems and swap area on your hard disk. This takes several minutes. You see the following messages:
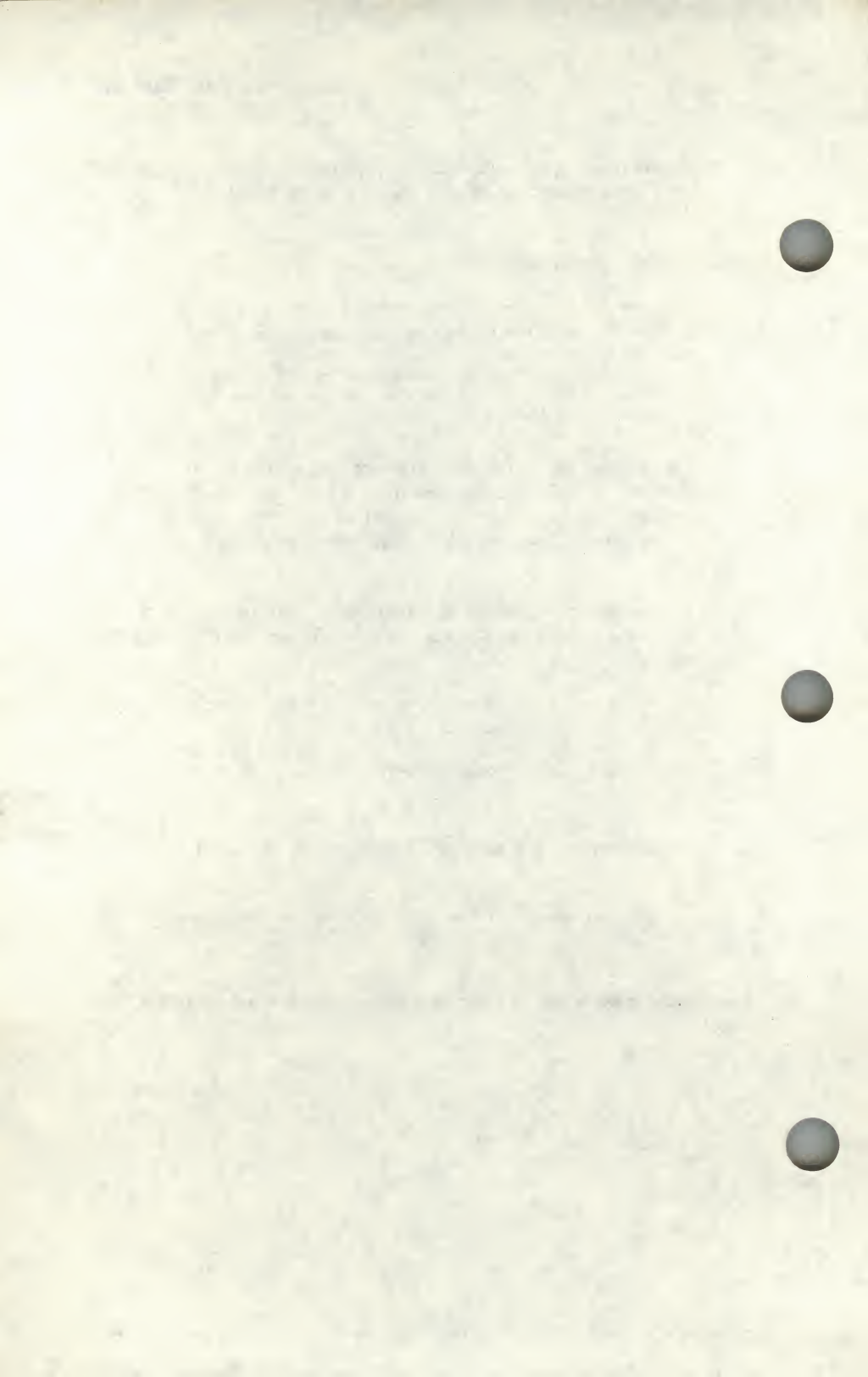
```
Making filesystems

Setting up hard disk root filesystem...
```

24.   When the process is finished, this message is displayed:

```
Initialization of the hard disk is now complete.
```

You should now return to Chapter 2 and continue the installation from step 17.

Appendix E

Setting the Time Zone Outside
North America

Setting Your Time Zone

This appendix describes how to set your time zone if you are not located in North America. Follow these steps:

1. After the initial prompt described in the time zone procedure, you see the following:

    ```
    What is the abbreviation of your standard time zone?
    Enter 1-9 characters or enter q to quit:
    ```

    Enter the abbreviation of your time zone.

2. You see:

    ```
    How many hours west of Greenwich Mean Time are you?
    Enter hh[:mm:ss] (e.g. 10:30:00 or 10:30, use negative
    numbers for locations east of GMT) or enter q to quit:
    ```

    Enter a number.

3. The following prompt is displayed:

    ```
    Does summer time (daylight saving time) apply at your location (y/n)?
    ```

    If summer time does not apply, enter **n** and proceed to step 7.

    If summer time does apply, enter **y**. You then see:

    ```
    What is the summer abbreviation of your time zone?
    Enter 1-9 characters or enter q to quit:
    ```

    Enter the summer abbreviation of your time zone.

E

4. Next you see this prompt:

    ```
    1. Week of the year (1-52).
    2. Week of a specific month (eg. 1st week of April).
    3. Day of the year, ie. Julian date (1-365).

    Select the method your time zone uses to convert from
    standard time to summer time (daylight saving time)
    or enter q to quit:
    ```

    Select a method and follow the prompts.

5. You see:

    ```
    At what time of day is the conversion made (use 24 hour clock)?
    Enter hh[:mm:ss] or press RETURN for default value of 2 am
    or enter q to quit:
    ```

    Enter a number or press ⟨Return⟩.

6. Depending upon which method your time zone uses, you see the
    following prompt:

    ```
    How many hours does your timezone adjust for summer time
    (daylight saving time)?
    Enter hh[:mm:ss] or press RETURN for the default value of 1 hour
    or enter q to quit:
    ```

    Enter a number or press ⟨Return⟩.

7. The time zone variable, /etc/TZ, is changed accordingly. Your time
    zone is now set. There is no need to change the .profile for users
    unless they call in from a different time zone and want to override
    the local standard.

You should now return to Chapter 2 and continue the installation from
step 30.

Appendix F

If You Created Additional Filesystems

Preparing Your Filesystems for Use

If you created any additional filesystems (such as /u) earlier in the installation, you must prepare them for use by following the instructions in this appendix.

1. Make the following **sysadmsh** selection:

    Filesystems→Add

2. You see the following:

    ```
    Filesystem Initialization Program

    This program performs maintenance tasks required to add or delete
    an existing filesystem. Would you like to:

            1. Add a new filesystem to system.
            2. Remove a filesystem.

    Select an option or enter q to quit:
    ```

    Enter **1** and press ⟨Return⟩.

3. You are next prompted for the device name:

    ```
    Enter a device name and press <Return> or q to quit:
    ```

    Enter the full pathname of the device from /dev. For example, to add a filesystem called u, you enter **/dev/u**.

4. You are now prompted to provide the name of the mount point to be used:

    ```
    Enter a directory name and press <Return> or q to quit:
    ```

    This directory is where the filesystem is mounted. For example, a filesystem called u is mounted on the directory /u.

F

5. The following is displayed:

    ```
    Reserving slots in lost+found directory ...

    When entering multiuser mode:
         1. Always mount filesystem
         2. Never mount filesystem
         3. Prompt before mounting filesystem

    Select an option:
    ```

    If you want the filesystem mounted automatically at system
    startup, enter **1**. If you wish it mounted only at the request of the
    system administrator, select **2**. If you select **3**, the system prompts
    you at system startup whether or not you want the filesystem
    mounted.

6. You are then asked whether or not you want to permit users to
    mount filesystems:

    ```
    Do you want to allow users to mount this file system? (y/n)
    ```

    You must respond **y** so that the system backup program can mount
    and unmount the filesystem as necessary.

7. The following messages are displayed when the process is com-
    plete.

    ```
    Updating system files ...
    Filesystem has been successfully added.
    ```

8. Next, you should mount the /u filesystem using the following
    sysadmsh selection:

    > Filesystems→Mount

9. To ensure that the system properly recognizes the new filesystem,
    press the exclamation point (!) and, when prompted, enter the fol-
    lowing commands (they are separated by a semicolon so that you
    can enter them on the same line):

    > **chmod 755 /u;chgrp auth /u**

    The new filesystem is ready for use.

Appendix G

Installation Glossary

Terms Used During Installation

If you are relatively new to UNIX Systems and/or to operating systems in general, the following describes most of the terms used in this guide.

backups
are copies of files from the hard disk that are saved on floppy disks or tapes in case of data loss.

bad track
is a small section of the hard disk that has lost its ability to store data.

bad track table
is a list of known bad tracks on the hard disk. It also contains space for tracks that may go bad in the future.

badtrk
is a UNIX utility that scans a hard disk and records bad tracks.

BIOS
is Basic Input/Output Services. The data tables describe the hardware recognized by the system that is hard-coded into the main circuit board of the computer (motherboard).

bit
is a "0" or a "1". In the binary system, there are no other digits.

block
refers to different quantities depending on the context. For the operating system and the utilities used to divide the hard disk (as discussed in **divvy**, for instance), a block is 1024 bytes (1 Kbyte); for most utilities and discussion of disk space usage, a block is 512 bytes (as used by the **custom** utility).

G

boot   means to begin the startup process. The common expression is "boot the system."

boot floppy   is a floppy disk containing the kernel that "boots" the system from the floppy drive.

bootstrap   is the program that loads the kernel into memory.

byte   is a group of 8 bits. A byte is the basic unit of information. A single byte can describe a character such as "a" or "5" or "#". For instance, in the ASCII character set (see ascii(M)), the character "A" is represented by a byte containing the bits 0100 0001, which is the number 65 in decimal.

custom   is a program that installs products and optional packages of the operating system.

cylinder   refers to the same track on each of the platters in a hard disk. For example, if a hard disk has five platters, the first cylinder consists of track one on each platter.

device driver   is a program that allows the kernel to communicate with a particular device. Certain drivers, such as the floppy and hard disk driver, are already built into the kernel. Others must be attached or "linked" into the kernel using the link kit.

divvy   is a program that divides a partition into separate filesystems.

dkinit   is a program that enables the UNIX System to recognize a hard disk that is not contained in the ROM BIOS.

driver   See **device drivers**.

fdisk   is the program that divides a disk into partitions, or different sections of the disk that will be occupied by different operating systems.

filesystem   is a subdivision of a partition that is separate from the area where the operating system and utilities are located. This filesystem can be mounted and unmounted, just like a floppy or other device.

flaw map   is a list of known bad tracks provided by the manufacturer.

fsck   is the program that checks and cleans a filesystem after a system crash, reconciling various system tables and lists to what is actually on the hard disk.

gigabyte   is one K of megabytes and is abbreviated "G." In other words, 1024 X 1024 X 1024 bytes or 1024 X 1,048,576 bytes or 1,073,741,824 bytes or 2 to the 30th power. This is a huge amount of information. You can create and use files of up to 4 gigabytes, although other factors may impose a lower limit of 1 or 2G. You may also have a gigabyte or more of storage on your hard disk.

hard disk   is actually a series of disks, or platters, that are scanned by a series of heads like those used on a tape recorder.

kernel   is the center of the operating system, a program that is always in memory and underlies all programs, applications, and utilities that run on top of it.

G

kilobyte

is also known as "K" (for kilo), which means 1000. One K is 1024 bytes. The reason a K is not just "1000" is because 2 to the 10th power is 1024, and in the binary computer world, everything is based on powers of 2 instead of powers of 10.

link kit

is a set of programs used to "link" or connect a device driver to the UNIX kernel. See also **device driver**.

megabyte

is sometimes abbreviated "meg" or "M" or "Mbyte". One megabyte is one K of Ks. In other words, 1024 X 1024 bytes or 1,048,576 bytes or 2 to the 20th power. This is quite a bit of information, and is often used to measure things such as the size of a hard disk.

mkdev

is a program that creates the device file associated with a device. To the system, a device is simply a file that is written to or read from. Thus, the primary hard disk is associated the file */dev/hd00*.

partition

is a division of a disk that contains an entire operating system. If an entire disk is used for a UNIX System, there is a single partition on the disk.

process

is each program or separate part of a program that is running concurrently on a system.

RAM

is Random Access Memory; it is the hardware memory (or primary storage) as opposed to the hard disk (secondary storage). On systems with virtual memory (like those based on the 80386 processor), the RAM and disk storage are essentially one unit.

reboot

is the act of bringing a system up after shutting it down.

root

is the top-level access account on a UNIX System that has unrestricted access to all files and utilities. This account is used only for system maintenance.

root filesystem

is the filesystem containing the operating system and its utilities.

run time system

or RTS, is the minimal software necessary on a UNIX System to run properly. Other packages outside the RTS can be loaded using **custom**.

sector

is a pie-shaped section of a disk.

shutdown

is the program that shuts down the system in preparation for switching off or rebooting.

single-user mode

See **system maintenance mode**.

super user

is another name for root.

swap space

is an area of the hard disk (not a filesystem) that acts as an extension of the hardware memory. Programs that are running but are waiting for input or device access are "swapped out" or moved to the swap space so that other programs can run in memory.

G

system maintenance mode   is also known as single-user mode. This is a stage of the startup process where certain maintenance functions are done, and other users are not allowed to log in. Like the *root* or super-user account, this mode has unrestricted access to the system.

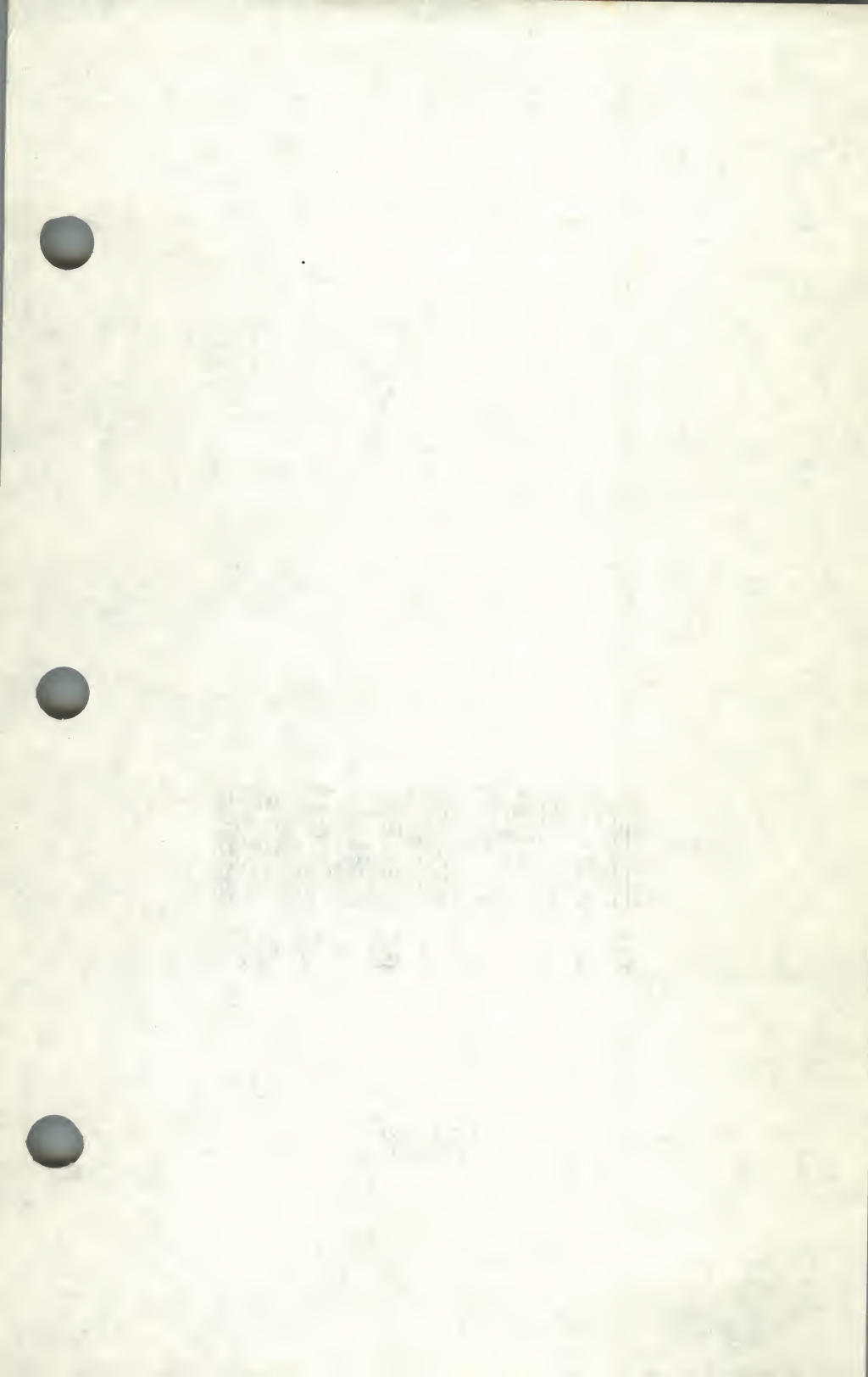**tpi**   is tracks per inch, a measure of floppy disk storage density.

track   is one of the concentric rings that a hard disk is divided into, similar to a groove on a phonograph record.

utility   is a program that is sometimes considered part of the operating system, but is not part of the kernel. It is an independent user program that runs on top of the system like an application. New utilities can be written by users and are often known as "tools."

512-210-943